Energy Conference

Ontario Economic Council
September 27-28, 1979

Reflections on the Fiscal and Economic Aspects of Government by Conference

J. Stefan Dupré

Once again, we are indebted to the author of Les Relations Intergouvernementales for a seminal and thought-provoking contribution to the study of Canadian federalism. Let me say that on first reading M. Veilleux's paper, my conclusion was that I had nothing but praise for it. If I amended this conclusion, it is only because I remembered the story of how the head of a major American foundation composed his letters to unsuccessful applicants for research funds. These letters consisted of a single sentence that said, "I have nothing but praise for your project." I have more than praise for M. Veilleux's paper. What I have consists of a few reflections that I will put before you for what they are worth. These reflections touch in turn upon (1) the fiscal and economic impact of Government by Conference; (2) agreement and disagreement in Government by Conference; (3) the collaborative vs. the classical approach to Canadian federalism; and (4) the question of openness and accountability.

(1) The Fiscal and Economic Impact of Government by Conference. The last twenty years have witnessed remarkable growth in the fiscal and economic importance of all levels of government, as M. Veilleux's statistics attest. It is worth pointing out, however, that virtually the entire growth to which he refers took place not between 1958 and 1978 but in the single decade from

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1965 to 1975. Government expenditures as a proportion of Gross National Product passed the 40 per cent mark in 1975 but have since retained the same proportion. It would be nice to say that Government by Conference can be credited with containing the relative growth of government spending in the last few years. It might be less nice to say that Government by Conference is to blame for the explosive growth of the public sector between 1965 and 1975. But it would be inaccurate to say either.

The decade from 1965 to 1975 is not a pretty period in Canadian fiscal history. To be sure, governments responded positively to strong demographic pressures and to popular demand for more sophisticated and more widely accessible services and transfer payments of all kinds. But the fast pace at which government expenditures were allowed to grow, to say nothing of the accompanying borrowing activities of both federal and provincial governments, turned the simple Keynesian model on its ear. In the Keynesian model, as we all know, government acts as a stabilizing factor vis-à-vis the inherent volatility of the private sector. I do not think it is too harsh to say that, between 1965 and 1975, government became the destabilizing factor.

Let me pick up at this juncture a point on which I would beg to differ from M. Veilleux's analysis. I must say that I find it passing strange to argue as he does that the federal government retained its capacity to stabilize the economy because federal expenditures maintained a constant proportion of GNP in the face of a situation where total government expenditures

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exploded. Had there been capacity and willingness on the part of the federal government to effect stabilization between 1965 and 1975, federal outlays as a proportion of GNP should have declined. That they did not, even when transfers to the provinces are omitted from the calculations, speaks volumes about the bankruptcy of stabilization policy in that decade.

To return to my main argument, the fact of the matter is that both levels of government went through a period in which their fiscal activity was out of control. But the individual governments, federal and provincial, are to blame, not the process of Government by Conference.

Public perception of uncontrolled fiscal activity lags behind both loss of fiscal control and its initial economic consequences. But come it does, manifesting itself at the polls and in the general mood of public cynicism to which M. Veilleux refers. Governments then react with assorted fiscal austerity programs. The process of Government by Conference registers successes like the substitution of block funding for shared-cost programs. Again, however, individual governments, not Government by Conference, have been the fundamental factor. As I read the block funding episode, governments had been unable to agree until they realized that the fiscal eggs laid between 1965 and 1975 had come home to roost as full-grown, angry chickens.

Let me offer the reminder, then, that Government by Conference does not have a fiscal or economic impact. Governments do. If

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the term Government by Conference is meant to suggest that Canadians have come to be governed (or misgoverned) by conference, it is misleading. Government by Conference is simply a process that provides a forum in which governments can share information and then can agree or disagree to act or flounder as a matter of their own responsibility.

(2) Agreement and Disagreement in Government by Conference. Fiscal and economic aspects of Canadian federalism are frequently cited as the success story of Government by Conference, in contrast to the fruitless and frustrating quest for a constitutional amendment formula and for constitutional change. The alleged reason for this success is that fiscal and economic matters are tangible and quantifiable, and hence more amenable to negotiation and compromise than constitutional matters, which are symbolic and abstract. M. Veilleux offers the sobering thought that the trend in fiscal and economic negotiations is toward the intangible and the non-quantifiable, or at best toward quantifiable matters in which assumptions and conjecture play a major role. This is true. It is one thing to quantify tax shares. It is quite another to estimate the level and distribution of economic benefits that would accrue from, let us say, less protectionist government procurement policies or a faster or slower move to world energy prices. The prospect, therefore, is of more cases of disagreement than agreement, and of a rising incidence of acrimony.

I submit that it is of the utmost importance to approach this prospect in perspective. As Donald Smiley has pointed out, in our constitutional system that combines federalism with the modern cabinet-parliamentary form of government, the mechanism of adjustment is predominantly intergovernmental, i.e. it is found in the process of Government by Conference. On the other hand in the American system that combines federalism with the presidential-congressional form of government, the mechanism of adjustment is to be found predominantly within and among the organs of the central government. Acrimony, deadlock, even temporary paralysis in presidential-congressional relations are accepted features of American governments, as are agreed policy compromises whose design is often something to behold. Even if we allow ourselves the jingoistic assumption that Canadians are inherently superior to Americans, we are engaging in monstrous self-delusion if we do not expect acrimony and deadlock to surface from time to time in federal-provincial relations. Let us remember too that the American system of intragovernmental adjustment in no way provided a more orderly accommodation of public sector growth between 1965 and 1975 than was the case in Canada. Nor was it any less bankrupt with respect to stabilization policy even though federal expenditures continue to account for a higher share of total government spending. If anything, our federal-provincial system of adjustment in the face of the world-wide energy crisis so far bears the earmarks of having facilitated a superior if still limited performance on the part of our governments.

As the changing subject matter of federal-provincial negotiations in the fiscal and economic realm occasions greater tension and acrimony, Canadians will do well to keep this kind of comparative perspective in mind when they are inclined to sit in judgment. And in any event, I can think of two factors that should temper what is an admittedly pessimistic outlook. The first lies in the extent to which, as M. Veilleux has noted, the agenda of negotiations will increasingly be weighted with items on which provincial interests diverge. This at least can be taken as promising a situation where adversary relations between Ottawa and all of the provinces will be relatively rare, and as heralding more opportunities for the federal government to develop its latent capacity to mediate, conciliate and if necessary arbitrate. The second lies in the importance of cultivating one of the long-standing features of fiscal and economic negotiations, namely that these negotiations hardly ever attempt to conclude agreements beyond a five-year period. The permanence of constitutional change has been an understandable barrier to agreement in that realm. Fiscal and economic matters should remain easier to resolve in that no agreement need look beyond a limited time period. To illustrate, I would be far more optimistic about the prospect of an intergovernmental agreement to reduce provincial preferences in government purchasing over a five-year period than I would be about the prospect of agreement to a constitutional change that would seek to ban such preferences.

(3) <u>The Collaborative vs. the Classical Approach to Canadian Federalism</u>. M. Veilleux has identified two approaches to the future of Canadian federalism and has masterfully disected the advantages and disadvantages of each. I would simply like to add two thoughts to those to those that appear in his paper.

The first is that the distinction between the collaborative and the classical approach can turn out in practice to be illusory. Consider the federal program of occupational training for adults as it was announced in 1965. Resting as it did on the claim that the federal government should assert its economic jurisdiction so as to be solely responsible for purchasing whatever occupational training it deemed appropriate for adults of its chossing, the original intent of the program was plainly a step in the direction of the classical approach. What actually happened, however, re-emphasized our dependence on the collaborative approach as the sought-after integration of federal economic jurisdiction became entangled with provincial educational jurisdiction.

My second thought is that the classical approach, even where it can be successfully followed, is unlikely to reduce the importance of Government by Conference. To begin with, federal-provincial negotiations are the necessary prelude to any attempt to follow the classical approach. Areas of entanglement must first be identified and degrees of disentanglement negotiated. Thereafter, Government by Conference will probably remain an important forum for monitoring the effect of more clearly divided jurisdiction, and all the more so if, as I have already stated, agreements to disentangle are most likely to emerge if they are

initially binding for only a limited period of time. Note that here I depart from M. Veileux only in the following respect. Whereas he advances the point that the classical approach should entail constitutional change, I maintain that this approach will be more effectively followed through short-term intergovernmental agreements than through formal amendments.

(4) <u>The Question of Openness and Accountability</u>. If only by repetition, it has become a part of the conventional wisdom that the Achilles' heel of Government by Conference is that it is a closed process whose participants are shielded from parliamentary scrutiny and accountability. Although M. Veilleux did not choose to probe this aspect of the conventional wisdom in his paper, I cannot resist this opportunity to air my own reflections on the subject.

To make sense of the question of openness and accountability, I consider it essential to distinguish sharply between Government by Conference at the summit and Government by Conference at the functional or operating level. "Summit federalism", if I may use the term, has evolved enormously since 1958. At that time, you will recall, Conferences of First Ministers were still sporadic events that were only beginning to receive staff support. Now, first ministers often meet more than annually and their conferences are supported by regular meetings of ministers of finance, ministers of intergovernmental affairs and continuing committees of officials. The picture is still being fleshed out as representatives of business and labour become adjuncts of

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the summit process. I am struck by the glare of publicity that has come to focus not simply on the personalities but on the issues that summit conferences involve. I am also impressed by the leap in the quantity and the quality of publicly released discussion and position papers. There is an ever-growing contrast between the openness of Government by Conference at the summit and the cloak of secrecy that surrounds Cabinet within individual governments. As for accountability to Parliament and to provincial legislatures, there is evidence that there has been a substantial increase in the attention accorded to summit matters in question period and by legislative commitees. Among the provinces, Alberta and Quebec offer documented evidence to this effect. I have therefore come to reject the conventional wisdom as being applicable to federal-provincial summitry.

On the other hand, where I believe the conventional wisdom about secrecy and non-accountability remains relevant is in the other eight-ninths of the iceberg that is Government by Conference--the hundreds of murky committees and structures where operational and functional matters are at stake. M. Veilleux knows whereof he speaks when he mentions complexity. It is complexity of structures, of numbers, of subject-matter. More than this, it is the complexity born of the bewildering maze that is modern government itself. The processes of summit federalism have expanded in part to cope with this complexity, just as cabinet offices, treasury boards and other central agencies have expanded within governments in an attempt, sometimes a vain attempt, to make decision-making manageable. The search for openness and accountability in the operation

of government continues. I deem this search fully warranted. What can go on in the operating and functional processes of Government by Conference can be far removed from the expressed wishes of elected politicians. Officials who share a particular functional specialty may try to use these processes not to further the ends of federal-provincial collaboration but to score victories over other groups of officials within their own governments. Again, there are instances where specialists with different backgrounds have been known to exacerbate federal-provincial negotiations by approaching them as academic battlegrounds in which to further interdisciplinary disputes rather than as forums in which to bridge intergovernmental differences.

So much for the roots of my concern. As for my prescription, it is very much my own, or so I was left to conclude when I recently advanced it elsewhere. It is simple and consists in this. Building on the recent work of the Senate Committee on National Finances, we should rediscover the utility of an appointed upper house. Here is the place where, a major step removed from the sensitivities of Government by Conference and from the adversary partisanship within the House of Commons and provincial legislatures, common-sense tests can be applied, on a selective basis, to ongoing areas of federal-provincial cooperation and/or entanglement.

Please note that this suggestion in no way aligns me with those who, like the Task Force on Canadian Unity, are marching

to the brass band of the German Bundesrat. Quite to the contrary, it is only a modest suggestion that we build on what has already begun and enhance, through the Senate of Canada, the openness and accountability of a process of Government by Conference that I view as essentially sound.

Annual Conference of
the Institute of Public
Administration of
Canada, Winnipeg, Manitoba.
August 29, 1979.

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September 18, 1979

Professor S. Dupre
Department of Political Economy
University of Toronto
Sidney Smith Hall
100 St. George Street
Toronto, Ontario M5S 1A1

Dear Professor Dupre

You will find, attached, a copy of the program of the OEC Energy Conference, to be held at The Four Seasons Hotel, Toronto, 21 Avenue Road. Will you please check your participation, as indicated here.

In order to provide some opportunity for registrants to participate, will you please limit your own talk to:

25 minutes, if you are a principal speaker and
to 12 minutes if you are a panelist.

You will have two weeks and a weekend from September 28th (October 15th) to make corrections to your paper, if you feel that any are needed. If we receive nothing by October 15th, we will send the version that has been circulated to registrants to the printer, along with a transcript of the discussion.

If you are free for lunch September 27th, join us at the OEC offices, 81 Wellesley Street East (a short taxi ride from The Four Seasons Hotel). Mr. Michael Davies of Polar Gas will talk briefly on a related subject. Please let us know if you plan to be present.

Yours truly

J. Anson
for
Lorie Tarshis
Research Director and
Executive Secretary

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Four Seasons Hotel,
21 Avenue Road,
Toronto, Ontario.

September 27-28th, 1979

ENERGY CONFERENCE PROGRAM

SEPTEMBER 27TH

5:00 - 6:00 p.m.	REGISTRATION - Third Floor Mezzanine
6:00 - 6:45 p.m.	RECEPTION - Tudor-Stuart Room, (3rd Floor)
6:45 - 8:15 p.m.	DINNER - Regency East (2nd Floor)
	CHAIRMAN, THOMAS E. KIERANS ONTARIO ECONOMIC COUNCIL
8:15 - 9:00 p.m.	Professor T.A. Wilson: AN OVERVIEW Department of Political Economy, University of Toronto
9:00 p.m.	Floor Commentary

SEPTEMBER 28TH

8:30- 9:00 a.m.	REGISTRATION - Second Floor Mezzanine
9:00-10:00 a.m.	Professor Leonard Waverman: ENERGY PRICING Institute of Policy Analysis, University of Toronto
Moderator:	Professor D. Smith Queen's University
Panelists:	a) E.C. Sievwright - Toronto b) P. Stauft - Toronto c) C. Watkins - Calgary
10:00-10:30 a.m.	Floor Commentary
10:30-10:45 a.m.	COFFEE
10:45-11:45 a.m.	Professor T.L. Powrie: TAXES Department of Economics, University of Alberta
Moderator:	Ian Stewart, Deputy Minister Department of Energy, Mines and Resources, Ottawa
Panelists:	a) D.G. Hartle - Toronto b) J. Helliwell - Vancouver
11:45-12:15 p.m.	Floor Commentary

SEPTEMBER 28TH, cont....

12:15 - 2:00 p.m.	LUNCHEON - Regency East and Centre (2nd Floor)
	CHAIRMAN, THOMAS E. KIERANS ONTARIO ECONOMIC COUNCIL
	Professor T.J. Courchene: ENERGY & EQUALIZATION Department of Economics, University of Waterloo, Ontario
Moderator:	J.D. Gibson, Consumers' Gas Company, Toronto
Panelists:	a) S. Dupre - Toronto b) D.G. Hartle, Toronto
2:00 - 2:30 p.m.	Floor Commentary

2:30 - 3:30 p.m.	Professors B.W. Wilkinson & B.L. Scarfe: THE RECYCLING PROBLEM Department of Economics, University of Alberta
Moderator:	Dr. Sylvia Ostry, Ottawa
Panelists:	a) J.A. Grant- Toronto b) G.D. Quirin - Toronto c) Leonard Waverman - Toronto
3:30 - 4:00 p.m.	Floor Commentary

4:00 - 4:15 p.m.	COFFEE

4:15 - 5:15 p.m.	Professor John Helliwell: TRADE POLICIES FOR NATURAL GAS AND ELECTRICITY Department of Economics, University of British Columbia
Moderator:	Dr. L. Tarshis, Toronto
Panelists:	a) D. Waddingham - Montreal b) B.F. Wilkinson - Calgary
5:15 - 5:45 p.m.	Floor Commentary

5:45 - 6:30 p.m.	RECEPTION - Second Floor Mezzanine
6:30 - 8:00 p.m.	DINNER
	CHAIRMAN, THOMAS E. KIERANS ONTARIO ECONOMIC COUNCIL
8:00 - 8:45 p.m.	RAPPORTEUR'S COMMENTS - Dr. Michael Spence Department of Economics & Harvard Bus. School Harvard University
8:45 p.m.	Floor Commentary

THE VISIBLE HAND:

THE PRICING OF CANADIAN OIL RESOURCES

A paper prepared for the
Ontario Economic Council

Leonard Waverman

Institute for Policy Analysis
University of Toronto
August 1979

FIRST DRAFT, NO CITATIONS

NOT FOR QUOTATION, COMMENTS WELCOME

Leonard Waverman
August 1979

The Visible Hand:
The Pricing of Canadian Oil Resources

1.0 Introduction

In 1776, Adam Smith published a monumental book which was to promote a revolution in the economic way of life of the then known world. Among the major tenents of Adam Smith's work were the role of price, the operations of the market place, and the 'invisible hand'.

In today's world, we have lost sight of the important underlying concept of price and its role in promoting economic development and economic efficiency. The pricing of oil and natural gas has become a vehicle for taxation and income redistribution rather than a guide to efficient resource allocation. In this paper, I wish to examine the present administrative mechanism in Canada for pricing of petroleum supplies, against the alternative of a functioning market system. I will discuss the 'correct' price to be charged within Canada for oil and natural gas; the impact of pricing on demand and conservation, on the competitiveness of industry and on the supply profile of these important natural resources.

2.0 Price and the Invisible Hand

Adam Smith's concepts of the role of price in determining demand and supply can be found in Chapter VII of Book 1;

> "When the price of any commodity is neither more nor less than what is sufficient to pay the rent of the land, the wages of the labour, and the profits of the stock employed in raising, preparing, and bringing it to market, according to their natural rates, the commodity is then sold for what may be called its natural price...
>
> The market price of any particular commodity, though it may continue long above, can seldom continue long below its natural price. Whatever part of it was paid below the natural rate, the persons whose interest it affected would immediately feel the loss, and would immediately withdraw either so much land, or so much labour, or so much stock, from being employed about it, that the quantity brought to market would soon be no more than sufficient to supply the effectual demand. Its market price, therefore, would soon rise to the natural price. This at least would be the case where there was perfect liberty."

The workings of the competitive market were described in Book IV Chapter 2;

> "But it is only for the sake of profit that any man employs his capital in the support of industry; and he will always, therefore, endeavour to employ it in the support of that industry of which the produce is likely to be of the greatest value, or to exchange for the greatest quantity either of money or of other goods . . . . He is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it."

Today the oil and natural gas markets in Canada are not ruled by the invisible hand of market forces. Instead the visible hand of a few politicians acting in the best interests of their own specific constituents controls the price of hydrocarbons. The rent of oil bearing land is fought over by warring jurisdictions. The market prices of oil and natural gas are held below world price levels, 'the natural' price levels, with the deleterious effects on supply and demand clearly established by Adam Smith over 200 years ago. Politicians are not foolhardy, real constraints force them to ignore the economic realities of the role of price. These constraints are partly constitutional, lying in the British North America Acts of 1867 and 1930. The major constraint preventing the full use of the market today is however self-interest. The very force that Adam Smith felt would minimize distortions in the economic system has become the reason for distortion.

The overriding concern in the pricing of oil and natural gas is income redistribution. The provinces with large reserves of oil wish to capture the rents they say are due them for their depleting birthright. The major consuming provinces argue that their economies will suffer much harm, if large amounts of revenue are transferred to the oil-rich provinces. The have-not provinces would like the wealth of the oil-rich west to be partially distributed to them. The constitution gives the power including the power of direct taxation to the owners of the natural resources. The Federal government with its powers over interprovincial trade and peace, order and good government attempts to reconcile the various demands including its own needs for tax revenue.

It is therefore not surprising that the concept of the correct pricing of Canadian hydrocarbon supplies has given way to arguments over the taxing of these resources. Price changes are really poorly disguised changes in excise taxes. Excise taxes unlike market equilibrium prices are economically inefficient; they distort demand and supply responses. The market price of oil, $15.00 per barrel in Toronto, is well below the 'natural' price or world price, $23.00. This per barrel differential in favour of consumers is an excise subsidy that exaggerates demand and prevents conservation. Because of the royalty system, for each barrel of oil they sell, producers receive not $13.75 but $6.00 to $8.00. The royalty as an excise tax diminishes the supply of oil found in Canada.

I propose that Canadian oil prices move immediately to near world oil price levels or $22.00 per barrel and that income taxes or net royalties rather than the present system of gross royalties become the major rent collection device. To show the merits of this plan, we must digress to Adam Smith and discuss each of demand and supply in detail, before placing the two blades of the market scissors mechanism together in an examination of the present administrative mechanisms for pricing of oil and natural gas reserves in Canada.

3.0 Demand

In 1978, oil and natural gas together accounted for 63% of the primary energy consumed in Ontario; oil, 41%; natural gas, 22%. The transportation sector accounted for over half the oil but none of the

natural gas consumed. Industrial uses took 13% of the oil and 55% of the natural gas. Residential customers consumed 17% of the oil (excluding transportation) and 21% of the natural gas. The two major users of hydrocarbons in Ontario in 1978 were the transport sector (primarily automobiles) and industry.

Energy prices in Ontario have nearly doubled since the October 1973 oil embargo by the Organization of Arab Petroleum Exporting Countries ('OAPEC'). The Consumer Price Index has also nearly doubled. To move to world oil price levels now would increase retail prices of oil products by at least 50%. Higher prices on one hand promote conservation, the exact magnitude of energy saving depending on the elasticity of demand. Higher prices on the other hand, it is said, redistribute income and seriously harm the competitiveness of the Ontario manufacturing sector.

The responsiveness of demand to changing energy prices has to this point in time been fairly slow. Since the transport sector is the major user of oil products, it is important to determine why consumers have not adjusted rapidly to changing energy prices. One obvious answer is that the falling real energy prices of the 1950's and 1960's affected the basic structure of our society - the spread of low density urbanization, the falling use of rapid transit, the high energy intensity of some industrial production. Responses to higher energy prices in the transport sector may be large but they will take time since higher energy prices cannot create a more densely packed urban environment overnight. Slowly, relative land prices in and around cities will adjust to higher energy prices

creating changing patterns of urban settlement. A 50% increase in gasoline prices, for example, would lower the price of rural land relative to land at the urban core by the capitalized value of the higher transportation costs from the city centre to the rural subdivision. A new house purchaser who was indifferent between a home at city centre and a house in the rural environs before the gasoline price increase would be equally indifferent after the gasoline price rise since the relative fall in value of the more distant house would exactly offset the present value of the gasoline costs attributable to the price increase. People who already owned homes outside the city would suffer capital losses. However, the impact of gasoline prices on the structure of the urban environment would only occur after the density increased at the city core in response to higher land prices. Such changes in density do not occur in five years, and not with increases in the real price of gasoline that has been in the order of 1% since October 1973.

Many accounts have been published of the changing distribution of new car purchases and one automobile company in particular is experiencing the pangs of producing the wrong size of cars. Yet, statistics indicate that the average automobile and its use has not changed significantly since 1973, largely for two reasons. First, the automobile market like the land market is highly organized with many buyers and sellers. Changes in fuel costs alter the relative capital values of autos by the present value of the change in relative fueling costs. A first time auto purchaser can therefore buy a used gas guzzler at a price commensurate with its relative fuel inefficiency or alternatively receive a rebate on a

purchase of a new gas guzzler. The impact of higher fuel prices is felt in the asset market, as Chrysler USA has found out. Since new car purchases are 13% of the rolling stock in Canada and 10% in the USA, it takes many years for the average fleet fuel efficiency to change. The environmental regulations of 1973 through 1976 decreased average fleet gasoline efficiency. It will therefore not be until between 1982 and 1985 that the higher gasoline prices beginning in 1974 will have real effects on gasoline consumption. This year has witnessed major differences in new car purchase patterns as between Canada and the USA. In the USA, a 40% increase in the price of gasoline plus shortages since March of this year have led to the average 1979 new car purchased in the USA being smaller than the average new car purchased in Ontario. Effects of keeping energy prices in Ontario below their natural levels then are that consumers purchase wasteful equipment based on the wrong price signals, urban spread continues and deficits grow for the T.T.C. .

3.1 The Income Distributional Effects of Price Ceilings

I have stated that income distribution is the key to Canadian oil pricing. Oil prices are kept below the world level to help consumers - households and industries. Does this subsidy benefit the poor more than the rich (a progressive subsidy) or is the subsidy regressive? Little information has been available on the consumption of energy by income groups. Do the poor purchase more or less energy as a percentage of income than the rich? Does the Maritimes consume more or less energy per dollar of consumer expenditure than Alberta?

In the following tables, the energy consumption for a sample of urban households by income class and across 11 cities is examined for Canada in 1969 and 1974 (the most recent date available). The tables show the direct energy expenditure, i.e., the expenditure on purchased fuel, light and power (electricity, natural gas, light fuel oil, etc. used to heat homes and water; gasoline to power autos; etc.). In addition, the indirect energy expenditure is also given. The indirect energy expenditure has been calculated by measuring, through the input output tables, the direct and indirect energy component of a dollar of final demand in each of fifteen components of consumer expenditure in each of the two years. For example, households spend a large proportion of their budgets on food. Energy is directly required to produce the food items purchased by households as final demand, for example, bread. Energy is also indirectly required to produce the inputs required for the production of the final demands, for example, fertilizer.

Table 1 shows the direct and indirect energy expenditures, for 1969, for a sample of urban households disaggregated by nine income classes. The first half of the Table (1A) gives expenditure amounts; the second half (1B) shows energy expenditures as a percentage of the total current expenditure on all items. Across all income classes, in Canada in 1969, an average household spent $934.53, directly and indirectly on energy. Indirect expenditures (of the kind described in the previous paragraph) accounted for 75% of the total energy expenditure (principally embodied in food, water power and fuel and automobile and truck purchases). Each type of energy expenditure (direct, indirect, combined) increases monotonically

TABLE 1: DIRECT AND INDIRECT ENERGY EXPENDITURES - URBAN HOUSEHOLDS - INCOME CLASSES, 1969

	INCOME CLASS	INDIRECT EXP.	DIRECT EXP.	TOTAL ENERGY EXP.
1A	ALL CLASSES	$706.24	$228.29	$934.53
	UNDER $4000	295.86	167.48	463.35
	$4000-$4999	471.83	196.65	668.48
	$5000-$5999	488.30	202.97	691.27
	$6000-$6999	623.37	220.61	843.98
	$7000-$7999	659.36	233.49	892.85
	$8000-$8999	740.11	247.36	987.47
	$9000-$9999	785.84	255.35	1041.18
	$10999-$11999	871.01	267.30	1138.30
	$12000-$14999	948.41	268.38	1216.79
	$15000 & OVER	1210.70	318.93	1529.63

	INCOME CLASS	% INDIRECT	% DIRECT	% TOTAL EXP.
1B	ALL CLASSES	10.89	3.52	14.41
	UNDER $4000	12.23	6.92	19.15
	$4000-$4999	12.76	5.32	18.08
	$5000-$5999	10.85	4.51	15.36
	$6000-$6999	12.25	4.34	16.59
	$7000-$7999	11.27	3.99	15.26
	$8000-$8999	11.44	3.82	15.27
	$9000-$9999	10.93	3.55	14.48
	$10999-$11999	11.46	3.52	14.98
	$12000-$14999	11.36	3.21	14.57
	$15000 & OVER	13.47	3.55	17.02

Direct Expenditures: direct purchases of fuels by household, e.g. electricity, fuel oil, gasoline

Indirect expenditures: energy component of household's purchases of commodities

% Direct: direct expenditure on fuels as a percentage of household total current expenditure

% Indirect: indirect expenditure on energy as a percentage of household total current expenditure

Sources: Statistics Canada, Urban Family Expenditures, 1969.
Statistics Canada, Input Output Division.

as income increases.

Direct energy expenditures as a percentage of total current household expenditure, however, decreases as income increases (the third column in Table 1B). Indirect energy expenditures as a percentage of total current expenditures show no consistent pattern when compared across income classes (column 2 in Table 1B). In fact, the wealthest families (those with incomes over $15,000 per year) spent a greater proportion of their income on indirect energy purchases than any other income class. By income class, direct plus indirect energy expenditures declined as a percentage of total expenditure to an income level of $9000 to $9999 and then rose. On average, in 1969, urban households spent 14.4% of their current expenditures on energy, 10.9% of this amount indirectly. Energy expenditures were then a substantial portion of the household budget in 1969.

Tables 2A and 2B give the identical information on energy expenditures for 1974. In 1974, on average, an urban household spent $1560.59, directly and indirectly, on energy. This amount represented 14.91% of the total household budget, as compared to 14.41% in 1969, not a substantial change. Except for the lowest income class (under $4000 in income), there was a marked shift in the five years, decreasing direct energy expenditure as a percentage of income and increasing indirect energy expenditures. In 1974, total energy expenditures as a percentage of total current expenditures declined fairly steadily across all income classes but the last.

TABLE 2: DIRECT AND INDIRECT ENERGY EXPENDITURES - URBAN HOUSEHOLDS - INCOME CLASSES, 1974

2A

INCOME CLASS	INDIRECT EXP.	DIRECT EXP.	TOTAL ENERGY EXP.
ALL CLASSES	$1271.68	$ 288.91	$ 1560.59
UNDER $4000	429.96	240.95	670.91
$4000-$4999	583.71	178.16	761.87
$5000-$5999	688.13	196.33	884.47
$6000-$6999	667.39	180.93	848.32
$7000-$7999	772.47	180.82	953.28
$8000-$8999	927.30	212.22	1139.52
$9000-$9999	991.82	222.36	1214.17
$10999-$11999	1089.08	240.30	1329.38
$12000-$14999	1309.96	299.26	1609.22
$15000 & OVER	1769.91	383.17	2153.07

2B

INCOME CLASS	% INDIRECT	% DIRECT	% TOTAL EXP.
ALL CLASSES	12.15	2.76	14.91
UNDER $4000	12.78	7.16	19.94
$4000-$4999	12.58	3.84	16.42
$5000-$5999	12.51	3.57	16.08
$6000-$6999	11.36	3.08	14.44
$7000-$7999	11.36	2.66	14.02
$8000-$8999	12.28	2.81	15.09
$9000-$9999	11.86	2.66	14.52
$10999-$11999	11.87	2.62	14.49
$12000-$14999	12.52	2.86	15.38
$15000 & OVER	14.41	3.12	17.53

Direct Expenditures: direct purchases of fuels by household, e.g. electricity, fuel oil, gasoline

Indirect expenditures: energy component of household's purchases of commodities

% Direct: direct expenditure on fuels as a percentage of household total current expenditure

% Indirect: indirect expenditure on energy as a percentage of household total current expenditure

Sources: Statistics Canada, Urban Family Expenditures, 1969.
Statistics Canada, Input Output Division.

Since domestic oil and natural gas prices are being sold in Canada below their opportunity cost, all households are being subsidized. In 1974, a household in the income class below $4000 spent $671., or 19.93% of its expenditures, directly and indirectly on energy and a household in the income class above $15,000 spent $2153., or 17.53% of its budget directly and indirectly on energy. The lowest proportion of expenditure going to energy products (14.02%) was in the $7000 - $7999 income class. Let us assume that 60% of the household's direct and indirect energy expenditures are in oil and natural gas and that all households consume the same proportion of hydrocarbons in their energy budget. Further assume that oil and natural gas prices in 1974 were 40% below world price levels ($6.50 - $7.00 in Canada as compared to $11.25, the posted price of Saudi Arabian light, plus transportation costs). Assume also, for this example, that the elasticity of demand for energy is -1.0. Under these assumptions, each household was subsidized by the Federal oil and natural gas price ceiling to the extent of 25% of its direct and indirect energy expenditures. Because consumers in the lowest income class consumed proportionately more energy than consumers in the highest income class, the poor benefitted from the subsidy more than the rich. The amount of progressivity in the oil subsidy in 1974 was very small however. The amount of the subsidy in 1974 to the average household in Canada was $390 (25% of energy expenditures). The subsidy to each and every household earning above $15,000 in income in 1974 was in the order of $538. The overall subsidy to those in the lowest income group (below $4000) in 1974 was $168. If households in the lowest income group consumed the same

amount of energy, directly and indirectly, as a proportion of total current expenditures as households in the highest income group, the energy consumption at low income levels would have been reduced by $81. The subsidy to the lowest income group, however, in terms of its progressivity was only $20. (.25 x $81.) proportionately more than the subsidy received by those in the highest income class.

Maintaining Canadian oil prices below world oil price levels does not act as an effective means of redistributing income. The rich received, proportionately to their expenditures, almost as much from the oil price subsidy in 1974 as did the poor. In fact, from the sample of households in Table 2, both the well-to-do (incomes over $12,000) and the relatively poor (incomes under $5000) received proportionately greater subsidies than the middle income groups. The words 'proportionately more' or 'less' in the above statements, while true suggest more than what in fact existed. As a means of redistributing income from the rich to the poor, subsidizing energy prices is totally ineffective.

What however about regional distributions of the subsidy? Do the relatively poor regions of Canada - the Maritimes and the Prairies receive proportionately more from subsidizing Canadian oil prices?

In Tables 3A and 3B are presented the direct, indirect, and direct plus indirect energy expenditures in 1969 by households in eleven cities. As a proportion of a household's total current expenditures, residents of St. John's spend the most on energy (18.17%) and residents of Edmonton the least (10.76%). This difference is substantial; if residents of

TABLE 3: DIRECT AND INDIRECT ENERGY EXPENDITURES, BY CITY, 1969, URBAN HOUSEHOLDS

	CITY	INDIRECT EXP.	DIRECT EXP.	TOTAL ENERGY EXP.
3A	ALL CLASSES	$706.24	$194.59	$900.83
	ST. JOHNS	733.05	260.99	994.04
	HALIFAX	730.59	223.71	954.30
	MONTREAL	703.03	193.21	896.24
	OTTAWA	705.70	199.00	904.70
	TORONTO	748.77	219.46	968.23
	WINNIPEG	655.98	150.87	806.85
	EDMONTON	660.01	114.48	774.49
	VANCOUVER	715.19	199.74	914.92
	QUEBEC CITY	593.72	183.82	777.54
	REGINA	678.32	140.71	819.03
	SASKATOON	631.56	149.91	781.47

	CITY	% INDIRECT	% DIRECT	% TOTAL EXP.
3B	ALL CLASSES	10.02	2.76	12.78
	ST. JOHNS	13.40	4.77	18.17
	HALIFAX	11.10	3.40	14.50
	MONTREAL	10.52	2.89	13.41
	OTTAWA	8.87	2.50	11.37
	TORONTO	9.28	2.72	12.00
	WINNIPEG	10.52	2.42	12.94
	EDMONTON	9.17	1.59	10.76
	VANCOUVER	10.99	3.07	14.06
	QUEBEC CITY	9.27	2.87	12.14
	REGINA	11.62	2.41	14.03
	SASKATOON	11.08	2.63	13.71

Direct Expenditures: direct purchases of fuels by household, e.g. electricity, fuel oil, gasoline

Indirect expenditures: energy component of household's purchases of commodities

% Direct: direct expenditure on fuels as a percentage of household total current expenditure

% Indirect: indirect expenditure on energy as a percentage of household total current expenditure

Sources: Statistics Canada, Urban Family Expenditures, 1969.
Statistics Canada, Input Output Division.

TABLE 4: DIRECT AND INDIRECT ENERGY EXPENDITURES, BY CITY, 1974, URBAN HOUSEHOLDS

4A

CITY	INDIRECT EXP.	DIRECT EXP.	TOTAL ENERGY EXP.
ALL CLASSES	$1271.63	$298.31	$1569.99
ST. JOHNS	1770.47	560.10	2330.57
HALIFAX	1441.91	366.16	1808.00
MONTREAL	1291.09	302.79	1593.88
OTTAWA	1317.51	279.05	1596.55
TORONTO	1276.32	283.49	1560.31
WINNIPEG	1147.93	300.03	1447.96
EDMONTON	1123.43	205.65	1329.08
VANCOUVER	1290.39	345.31	1635.70
QUEBEC CITY	1231.26	287.38	1519.14
REGINA	1244.12	337.93	1532.05
SASKATOON	1165.30	279.96	1445.25

4B

CITY	% INDIRECT	% DIRECT	% TOTAL EXP.
ALL CLASSES	12.15	2.85	15.00
ST. JOHNS	16.22	5.13	21.35
HALIFAX	13.59	3.45	17.04
MONTREAL	12.62	2.96	15.58
OTTAWA	11.05	2.34	13.39
TORONTO	11.30	2.62	14.42
WINNIPEG	11.55	3.02	14.57
EDMONTON	10.65	1.95	12.60
VANCOUVER	12.52	3.35	15.87
QUEBEC CITY	12.10	2.83	14.93
REGINA	12.78	3.47	16.25
SASKATOON	12.95	3.11	16.06

Direct Expenditures: direct purchases of fuels by household, e.g. electricity, fuel oil, gasoline

Indirect expenditures: energy component of household's purchases of commodities

% Direct: direct expenditure on fuels as a percentage of household total current expenditure

% Indirect: indirect expenditure on energy as a percentage of household total current expenditure

Sources: Statistics Canada, Urban Family Expenditures, 1969.
Statistics Canada, Input Output Division.

St. John's could have spent the same proportion of their expenditure on energy as residents of Edmonton, they would have saved $405 per year.

The 1974 pattern of energy expenditures by households distributed across cities is given in Table 4. Residents in St. John's spent 21.35% of their budget directly and indirectly on energy or 8.7% more than residents in Edmonton. In St. John's, 8.7% of the total expenditure per household amounts to $954.00. The difference in energy expenditures as a proportion of total expenditures between St. John's and Edmonton involves innate differences in transportation costs as well as differences in expenditure patterns; Edmonton being near to the major Canadian oil fields. Assume that after accounting for differences in transportation costs that the oil price subsidy for St. John's as well as Halifax relative to Edmonton was 20% in 1974. Residents, then, in St. John's received $187 and in Halifax $91 proportionately more in subsidy than residents of Edmonton.

Residents of Ottawa and Toronto spent somewhat less on energy than the average urban household and therefore residents of Ontario did not benefit proportionately from the oil price subsidies compared to households in other cities across Canada. The average household in Ottawa and Toronto spent nearly $1600 directly and indirectly on energy in 1974. Assuming again a 25% subsidy on total energy consumption, maintaining oil prices below world levels in 1974 subsidized the typical household in Ontario by $400.

Residents of six cities - St. John's, Halifax, Montreal, Vancouver, Regina, Saskatoon - received proportionately more from the oil price subsidy than the average Canadian urban resident. Only residents of St. John's and Halifax received appreciably more ($187 and $91 respectively). The oil price subsidy then does tend to equitably redistribute income across regions. However, in most cases the amounts are small, and it is not obvious that residents of Vancouver or Montreal need subsidies. The data in Table 4 indicates that the oil price subsidy was not an effective means at all of redistributing income across income classes. Combining the information on energy expenditures by income class and by city may suggest that the wealthier residents of the poorer regions benefit from the domestic oil price ceiling - not likely a desirable outcome.

In summary, the facts at least for 1974, indicate that the goal of income redistribution cannot be used to justify maintaining oil and natural gas prices below world levels. While consumers benefit (in 1974 by an average of $390 per urban household) at the expense of producers and shareholders, the subsidy benefits both rich and poor equally. If income redistribution is an important goal, it can be achieved at less cost by simply subsidizing only the poor. The subsidy of oil prices, because it distorts consumer choice, generates inefficiencies. Lowering 1974 income taxes by $200 for each household with an income below $6000 would have yielded the same benefits to the poor as maintaining Canadian oil prices 40% below world levels.

3.2 The Competitiveness of Industry

How do energy pricing policies affect the costs and hence competitiveness of the Ontario manufacturing sector? For nine industries, the cost of total fuels used as a percentage of the total costs of production is given in Table 5. These nine industries consumed 85% of the total fuel used in Ontario manufacturing in 1977. For four of the industries (Primary Metals, Paper, Non-metallic Minerals, Chemicals), fuels represent between 3% and 5% of total production costs. For the other industries, fuel costs represent less than 2% of total costs. Also given in the table are labour costs as a percentage of total costs. Note that labour costs are at least five times as great as energy costs for all but two industries - Tobacco (where both costs are small) and Non-metallic Minerals (the most energy intensive industry).

A recent study for the Ministry of Industry and Tourism has examined the cost structure of all 20 2-digit manufacturing industries in Ontario, utilizing econometric cost function models. For each of these 20 industries an economic model of the ways in which factors of production (capital, labour energy and materials) are combined to produce output was estimated with data for the 1961 - 1973 period. The models were static or long run equilibrium models assuming that firms can fully adjust to new higher factor prices within one year. In most industries a good deal of interfuel substitution was found (e.g. as the relative price of coal to oil rose over the period, oil products were substituted for coal) as well as a significant amount of substitution of capital and

Table 5

Simulations of Impact of Higher Factor Prices on Ontario Manufacturing Industries

		Energy Costs	Labour Costs	SIMULATION ONE				SIMULATION TWO				SIMULATION THREE		
				% Impact On				% Impact On				% Impact On		
	Industry	Total Costs (1975)	Total Costs (1975)	energy expenditure	total costs	quantity of capital	quantity of labour	energy expenditure	total costs	quantity of capital	quantity of labour	labour share of total costs	total costs	quantity of capital
01	Food & Beverages	.0097	.124	20%	0%	0%	0%	43%	4%	3%	-1%	7%	1%	2%
02	Tobacco	.0033	.075	0	0	0	0	0	2	1	1	4	1	0
03	Rubber	.0135	.213	-12	0	0	1	-15	3	1	3	-2	2	1
05	Textiles	.0138	.243	9	0	0	0	12	3	2	1	1	3	6
10	Paper	.0409	.218	9	1	1	1	10	4	5	4	2	3	7
12	Primary Metals	.0396	.230	3	1	0	0	6	4	1	4	1	3	4
15	Trans. Equip.	.0046	.104	8	0	0	0	15	5	2	3	-2	2	2
17	Non-Metallic Minerals	.0580	.242	15	1	1	2	15	5	3	3	4	2	3
19	Chemicals	.0386	.155	-2	0	3	-1	-5	5	6	-3	8	1	4

Simulation One: Increases in Fuel Oil and Natural Gas Prices of 35%, Electricity Prices of 12%, Coal Prices of 8%

Simulation Two: Increases in all energy prices of 50%

Simulation Three: Increase in labour price of 10%

labour for total energy. The estimated own price elasticities for energy (the percentage change in energy consumption with respect to a percentage change in energy price) were inelastic (averaging -.6 for energy intensive industries).

Several simulations were run with these models in an attempt to determine the impact on total costs of production of higher prices of inputs especially energy.

In the first simulation case, it was assumed that a $5 per barrel increase in the price of crude oil would be fully reflected in the price of residual fuel oil, increasing its present price of $14 by 35%. The price of natural gas in this simulation was also increased, so that natural gas price levels were 85% of Toronto city gate crude oil prices. Electricity prices were increased by 12% and coal prices by 8% (all on a british thermal unit ('b.t.u.') basis).

The results of the first simulation can be seen in column 1 of Table 5. The reader should note that since the models are long run equilibrium models, they ignore the real time constraints and the difficulties in adjusting quickly to such large price changes. Indeed, the immediate effects of sharp increases in prices of oil products and natural gas could be much different from the results given in this table. Concentrating, however, on the ultimate long run response, in <u>no</u> case does the 35% increase in the price of residual fuel oil and natural gas increase total costs of production by more than 1%. The reasons for these results are as follows. First, in many industries, fuel is not a significant portion

of total costs. Second, the estimated models indicate that the higher profile of some energy prices induces firms to substitute less expensive energy products for the now relatively more expensive energy products. In the vast majority of cases, the indication was that given the magnitude of relative price changes, coal would be substituted for oil and natural gas. This is not a result which is verified by trends in industry energy consumption. In 1978, coal represented less than 1% of the b.t.u.'s used as fuel in the Ontario industrial sector. As Ontario is poor in coal resources except for substantial lignite reserves in the James Bay area, coal may not be a realistic substitute to the higher prices forecast for oil and natural gas. The third reason that total costs do not respond in magnitude proportional to the increase in energy costs is the substitution of capital or labour for energy. The quantities of capital and labour, as indicated in Table 5 do not increase markedly in response to higher energy prices. However since labour and capital inputs are much greater in size than energy inputs, small percentage changes in labour and capital can substitute for large percentage changes in energy.

In order to isolate the effects of interfuel substitution from the effects of the substitution of capital or labour for energy, in a second simulation all energy prices were increased by 50% with the prices of labour and capital remaining unchanged (and the price of materials increased by 3% to reflect the price rise of the energy component). Total costs of production increased by 2 to 5% as a result of a 50% increase in all fuel costs, while total energy expenditure shows wide patterns of

change, reflecting the substitution of labour or capital for energy. The greater impact on total production costs in simulation two is due to the absence of interfuel substitution in the second simulation. If coal is, in fact, not a viable alternative to oil and natural gas then a 35% increase in the price of hydrocarbons will likely increase total costs of production in the Ontario manufacturing sector by two to four percent. Note, however, that in all cases, higher energy prices induce greater capital investment and in most cases greater employment as well; these impacts mitigate against the deflationary effects that increasing energy prices cause.

In the third simulation reported on Table 5, energy prices were left unchanged and labour wage rates were increased by 10%. The increases in total costs of production range from 1% (Tobacco, Chemicals) to 3% (Textiles, Paper) as a result of the 10% increase in the price of labour. Higher wage rates also induce a substitution of capital for labour as indicated in the last column of the table. For the Ontario manufacturing sector a 12% increase in wage rates likely has a similar impact on the total costs of production as a 35% increase in fuel oil and natural gas prices.

In another simulation (one not reported in this paper), the price of natural gas was kept to 75% of the Toronto city gate oil price. This differential (75% versus 85% of oil prices) had little affect on the model results, slightly increasing the use of natural gas at the expense of fuel oil. However, given the current oversupply of residual oil in the Ontario market, maintaining the price of natural gas at 75% of the

Toronto city gate crude oil price would likely only deter oil refiners from passing on increased crude oil costs in the price of residual. As a result, lowering the controlled relative price of natural gas to crude oil may not lower the market price of natural gas to residual oil.

In summary, substantial increases in oil and natural gas prices will have some impact on the competitiveness of the Ontario manufacturing sector, an impact however not out of proportion to the effects of increases in real wage rates of 3 to 4% (12% in nominal terms). While we should not minimize those impacts they are not of the order to substantially harm Ontario manufacturing. In some industries, some firms will be specially hurt. To subsidize all consumers, residential and industrial, commercial and transport, rich and poor, to protect the few that need assistance is unwise charity. The total cost would be lower and it would be more efficient to directly subsidize those firms which will be seriously damaged in a transition to world oil price levels.

4.0 Supply

For most commodities, the 'law of supply' holds - the higher prices, other things being equal, brings forward increased production. Three issues complicate the law of supply for hydrocarbons - the large difference between the retail price of oil and the net to producers; the lengthy period between the time the decision is made to increase production and the time when that increased production actually comes on the market and the depletable nature of these resources.

4.1 Excise Taxes and the Price of Oil

In 1978, Canadian oil producers on average received $5.64 per barrel of the $12.75 per barrel price according to the Ontario Energy Review of June 1979. Provincial governments received $5.12 per barrel, most of this in the form of ad valorem gross royalties, determined as a percentage of the gross revenue per barrel. By the British North America Act of 1867, both federal and provincial governments can levy direct taxes, but only the federal government can levy indirect taxes. An indirect tax is defined as a tax which is paid by the consumer rather than the producer, i.e., a tax which determines the price. Indirect taxes are beyond the powers of a provincial government for they may determine the price of a product which is sold in interprovincial trade. Income taxes have been held to be direct taxes, i.e., taxes which are not price determining but instead price determined. As the direct tax cannot affect the price in the market, it is a levy on producers who are resident in the province.

The power to enact royalties, the rights to revenues from minerals, had been given to the original founding provinces in 1867 and to the Prairie provinces in 1930. Royalties levied by the provinces as land owner are not regarded as indirect taxes. In Manitoba, where freehold mineral and oil rights prevail, the taxation of petroleum and minerals is via a 'net income' tax rather tha a gross royalty. In Alberta, where the province owns most of the mineral rights itself (some 80%), these rights not having been alienated to freehold land purchasers during settle-

ment, a gross royalty system is used and does not appear to be, a priori, ultra vires the power of the Provincial legislature. The Supreme Court held in November 1977 that the 1974 Saskatchewan government tax schedules for oil revenues were indirect taxation and ultra vires the legislature of Saskatchewan. That 1974 scheme attempted to tax 100% of the differential between the basic wellhead price and the Canadian price of oil. In terms of 'pure' theoretical economics, any gross royalty is an indirect tax for it is a form of excise tax. Excise taxes are shared between consumers and producers depending on the relative elasticities of demand and supply.

Disregarding legal questions, it is clear that the present debates in Canada over the price of oil are directed at who ought to receive the excise tax and in what form. The difference between the world price and the controlled wellhead price in Canada is a negative excise tax to consumers; we have seen who benefits from that subsidy. The Alberta gross royalties benefit Alberta residents. Discussions of the price increase for 1980 are now explicit discussions of excise taxes not prices. The Government of Ontario has released a document stating that a $5 per barrel increase in the price of oil would lead to increased revenues of $4.77 billion, $2.2 billion accruing to the producing provinces. In order to achieve self-sufficiency at minimum dislocations to the economy, the Ontario Government believes that $2.81 billion of this $4.77 billion should be placed in a National Energy and Employment Adjustment Fund rather than to be allocated to investments through producing provinces or through a functioning market system. Most bureaucratic actors seem to have accepted

the argument that the oil and natural gas industry does not need additional cash flow, that additional revenues to oil firms would not encourage exploration but would instead likely flow out of the country. If these views are accepted, Canada, within one year, could have a wellhead price of $18.75 per barrel with at most $7.50 per barrel flowing to petroleum companies.

This situation would in my judgement be a serious error for Canada as a nation to accept. This differential between the wellhead price and the net to producers ignores the economic distinction between marginal and intra marginal fields and will, I suggest, have serious negative ramifications on Canadian energy self-sufficiency in the long run.

Royalties are after all, designed to extract some portion of the economic rent of some oil fields. Not all barrels of oil produce the same or even any economic rent. The basic ad valorem gross royalty cannot distinguish between a marginal barrel costing $18.75 to produce and an intra marginal barrel costing $1.75 to produce. The royalty, as any excise tax, drives a wedge between the 'natural' price and the net price to producers and therefore discourages production, or in this case, discovery. We will, if we continue in this direction, find all the oil in Canada which costs $7.50 to produce rather than the oil which should be found at the price gross to consumers, $18.75. Producing provinces are well aware of the disincentive effects of gross royalties and as a result royalty schedules have been introduced whose effective rates depend on the volume of funds reinvested in exploration and development. The connection between

rent collection and development incentives is crude at best since it assumes that the degree of reinvestment is equal to the percentage of income which is rent. All project developers, of course, have an incentive to argue that their projects are special, i.e., high cost and should be exempt from royalties. Syncrude, for example, receives a 25¢ per barrel levy from each barrel of oil sold in Canada so that its product can be sold at world price levels. In my view, it is basically inefficient and open to manipulation to allow special exemptions from taxations, these special examptions being based on individual negotiations.

In our constitutional warfare, we have subverted the market system to the point where price no longer is a signal to producers or consumers. Price increases for oil are not viewed as the marginal wedge to allocate resources but as the slice of revenue to squabble over.

It is therefore time to re-examine and reform the role of price and the present rent collection devices in order to prevent serious long run distortions from appearing in the oil market. Price should become the signal to both consumers and producers of the marginal costs of production. Under existing and contemplated royalty schemes, attempts to collect rent via two kinds of excise taxes, gross royalties and subsidies to consumers, will create economic losses.

The best form of rent collection device is the income tax; no income, no rent, no tax. With a wellhead price of $18.50 and the complete absence of a gross royalty scheme, the marginal barrel costing $18.50 would be discovered. The income tax could be 50% or even 75% of net profits but if the tax affects only intra marginal rent not marginal costs then

the income tax will not distort producers' incentives. A net royalty is akin to a profits tax; it is levied on gross revenue less an allowance for production costs. Net royalty schemes are not unknown. The Ontario Mining Tax for example levies a tax on mine revenue less working expenses, depreciation on plant and equipment exploration and development costs and notional costs for processing. There are a number of advantages to the use of a net royalty tax, generally, instead of the gross royalty in use at present, and some disadvantages.

The net royalty will not distort producers' incentives to find oil at the wellhead price if the costs deducted from revenue are actual costs and not some notional average. Marginal pools will be discovered and developed where the net royalty flow to the governments from those marginal pools is zero. The total revenue from the net royalty tax to governments will, of course, not be zero. In 1978, total royalty taxes paid by oil and gas producers amounted to $2,991,854 or 30% of total industry revenues of $10,051,7 million. According to Oilweek, total net revenues (gross revenues less expenditures excluding royalties) was $4,871 million. A net royalty of 61% based on net revenues as defined crudely above would however induce more exploration at the margin than the present gross royalty system and yield the same revenues to the provinces.

In 1976, the latest year for which Corporation Taxation Statistics are available, the net book profit after taxes (including royalties as a portion of net profit) for the Canadian oil and gas industry was $4,583 million. Net taxable income was $2,574.7. Total royalties in 1976 amounted

to $2,103 million; these royalties representing 45% of net book profit after taxes and 82% of net taxable income. The exact value for the net royalty which would yield the same provincial revenues as were actually earned in 1976 is then likely to be in the range of 45% to 65%.

The net royalty or net profits tax is also on a more secure constitutional ground that the presently used gross royalty. In my view, gross royalties are indirect taxes. Today they affect the speed of adjustment to world oil price levels and are paid by consumers. In the future, gross royalties would affect the market price of oil because of their disincentive effect on finding rates.

Setting the price of Canadian oil at world price levels is important as an inducement to supply additions. This inducement is <u>not</u> through the effects of higher prices on industry cash flow; investment funds can be raised by petroleum companies from external capital markets. The importance of price in the market system is its impact on decisions at the margin. Excise taxes have perverse effects at the margin; net royalties do not.

There are many problems involved in using only net income taxes to exact rent from the oil and gas industry. First, the present royalty system is simple, relatively cheat proof and inexpensive for a province such as Alberta to operate. If Alberta, for example, were to move to a net royalty tax, extensive records of the producing companies would have to be analyzed. The refining and marketing expenses as well as the exploration and development expenses of large integrated oil companies with head offices in other provinces would have to be calculated. The profit from production as separate

from the profit of refining or marketing would have to be determined. Room for manipulation of records exists. The accounting procedures of the oil and gas industry including the evaluation of intangible assets would have to be standardized. There is no reason, however merely excuse, why these problems could not be overcome. If countries such as Bolivia can use net royalty systems for the taxation of minerals, sophisticated income tax procedures could be created in Canada.

Moving the world price of oil has then important benefits on both the demand and supply sides. The speed with which we move to these new equilibrium prices is also important.

Producers of depletable deposits compare the time profile of expected future prices with the time profile of expected interest rates in order to determine whether it is more profitable to produce the inherently fixed stock of oil today or tomorrow. Were, for example, the owner of an oil pool in Alberta to decide that future oil prices would increase at a rate greater than the expected interest rate, then it is clear that no production would take place today. If the oil is sold today, and the receipts deposited in a bank, the net worth of the oil producer increases at the interest rate. Were the oil producer to refrain from production today and instead produce tomorrow, he would in effect be banking his oil deposits in the ground. Selling these resources tomorrow when the price of oil increases at a rate greater than the rate of interest is preferable to banking the receipts of today's sale.

Producers then have incentives to refrain from announcing discoveries or to refrain from searching today in areas with high probabilities of

success if the expected price increase for oil is greater than the interest rate. Since 1974, Canadian oil price policies have been to gradually adjust the domestic price of crude to a quickly moving target - the world oil price. The Canadian domestically controlled oil price is presently \$13.75, the prime interest rate is 12%. A policy of increasing the domestic price of oil at say, \$2.00 per year for the next three or four years guarantees producers a rate of return for oil deposits in the ground in excess of the rate of interest earned on deposits in the bank. Under this scenario, no large additions to oil reserves would be found. The facts are that for the last several years additions to proven oil reserves have fallen behind production. These facts are consistent with the hypothesis that producers are acting to maximize the present worth of their oil reserves by maintaining the oil in the ground. Moving quickly to world oil price levels would today bring forth the additional reserves that would not otherwise be found until the present oil pricing policy eventually forced the domestic price to world price levels.

5.0 Summary

I have argued that the present Canadian oil and natural gas pricing policies should be dropped in favour of a policy which moved the price to near world levels this year. This quick adjustment is needed for supply and demand conditions. On the supply side, maintaining a rate of increase in domestic oil prices at or below interest rates (10%, 12%) would deter discovery in the near term. Consumers should no longer be sheltered from

reality; oil is worth $23.00 a barrel not $13.75. To continue to subsidize oil consumption delays the implementation of the necessary consevation practices. Examining American and Canadian car purchases in 1979 in conjunction with gasoline prices changes in the two countries is convincing evidence of the inefficiencies engendered in Canada by these oil price subsidies.

Two specific issues that trouble consuming provinces have been examined in detail - the income redistribution effects of the oil price subsidy and the impact of energy prices on the costs of production in the Ontario manufacturing sector. The conclusion is inescapable that oil price subsidies benefit consumers (at least in the short run) but that rich and poor benefit nearly proportionately. An oil price subsidy is a poor device to redistribute income. Increasing oil and natural gas prices will increase the total costs of manufacturing in Ontario by 2 to 5%. While this is not a negligible amount, it is equal to the impact of a 12% increase in wage rates. If specific individuals or firms are hurt by rapid oil price increases, let us subsidize them directly, not all firms and all consumers.

Increasing the wellhead price of oil via increases in excise taxes is the wrong policy for Canada. An excise tax, or a gross royalty is an inefficient tax collection device, a device which drives a wedge between the market price and the net to producers. Present policies may lead to a situation in 1980 where the producers' net is $7.50 out of a wellhead price of $18.75. We will then find all the oil in Canada costing $7.50 to produce. The correct supply response would be to find that barrel of oil

costing \$18.75 to produce. I recommend that the present gross royalty system be scrapped in favour of a net royalty system. The net royalty in distinguishing between marginal costs and marginal rent has a far greater incentive effect for producers than a gross royalty.

Were Adam Smith alive in Canada today, he would be calling for a return to a market and a price system for oil and natural gas. I can do no more than agree with his views.

Taxation and Energy

by

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A paper prepared for

the Ontario Economic Council conference on energy

September, 1979

Outline

1. Magnitude of flows of revenues
2. Taxation and resource allocation
3. Taxation and distribution of income
4. The price of energy and inflation

Preliminary - not to be quoted without permission.
Comments welcome.

* I would like to acknowledge the considerable assistance of B.L. Scarfe in the preparation of this paper, but its shortcomings are my own.

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Taxation and Energy

This paper discusses taxation in a broad sense, including not only conventional taxes but also the closely related matters of royalties and price-regulation. The discussion is almost entirely about the example case of oil. Four topics are surveyed:

1. The magnitude of changes in flows of revenues resulting from changes in the price of oil.

2. Taxation and the efficient allocation of resources to production of energy.

3. Taxation and the equitable distribution of revenue from sales of energy.

4. Macro-economic effects of changes in policies toward taxation and pricing of energy.

1. Magnitude of flows of revenue

Table 1 sets out the amounts and regional pattern of the original sources and final destinations of oil and its products in Canada in 1978. On the basis of these volumes, Table 2 shows the direct financial implications of a two-dollar-per-barrel increase in the price of oil in Canada. Obviously, regions that are net importers lose, and net exporters gain from the increase. In order to suggest the relative importance of these gains and losses, they are also shown as percentages of the estimated gross incomes of the regions affected. It is apparent that even a two-dollar increase has significant effects; for a ten- or

Table 1

Sources and disposition of crude oil and petroleum products by region, Canada, 1978 ('000,000 bbls.)

Sources to Canada of crude oil and products	Region	Domestic disappearance of petroleum products
Crude oil production:		
-	Atlantic	87.8
-	Quebec	182.8
0.6	Ontario	217.7
3.8	Manitoba	21.7
60.5	Saskatchewan	25.0
442.3	Alberta	56.9
13.7	British Columbia	63.7
0.9	North	4.1
Sub-total:		
521.9		
Trade in oil and products:		
Imports 243.5		
- Exports -144.6		
Change in inventories, etc.:		
39.0		
659.8	Total Canada	659.8

Source: Compiled from Statistics Canada, Crude Petroleum and Natural Gas Production (26-006) and Refined Petroleum Products (45-004)

Table 2

Net direct effect on gross income by region resulting from a two dollar increase in the price of oil

Region	Net direct effect on gross income in $000,000	as % of total income
Atlantic	- 175.6	-1.3
Quebec	- 365.6	-0.7
Ontario	- 434.2	-0.5
Manitoba	- 35.8	-0.4
Saskatchewan	+ 71.0	+0.8
Alberta	+ 770.8	+3.0
B.C. and North	- 106.4	-0.4
Federal budget	+ 197.8	
Value of change in inventories, etc.	+ 78.0	
Total Canada	0	

Source: Calculated simply by applying a $2 price increase to the volumes in Table 1. The improvement in the Federal budget is the net result of saving $2 per barrel of import subsidies and losing $2 per barrel of export tax. Provincial gross incomes for 1978 were estimated by dividing Canadian 1978 GNP according to provincial shares of 1977 GDP, the latter from Statistics Canada, Provincial Economic Accounts.

twelve-dollar increase, that would bring the Canadian price near the world price, the numbers would all be five or six times larger.

The effect on the Federal budget from an increase in the domestic price of oil occurs through the Federal policy of an export tax and import subsidy. For consistency with a two-dollar domestic price increase, the rate of tax on exports and the rate of subsidy to imports would both have to be reduced by the same amount, and there would be a net saving in the Federal budget because the volume of imports is larger than the volume of exports.

These striking financial effects arise from changes in the price of oil alone, without allowance for associated changes in the price of natural gas or other sources of energy.

2. <u>Taxation and efficient resource allocation</u>.

(a) Taxes or royalties and the profit motive.

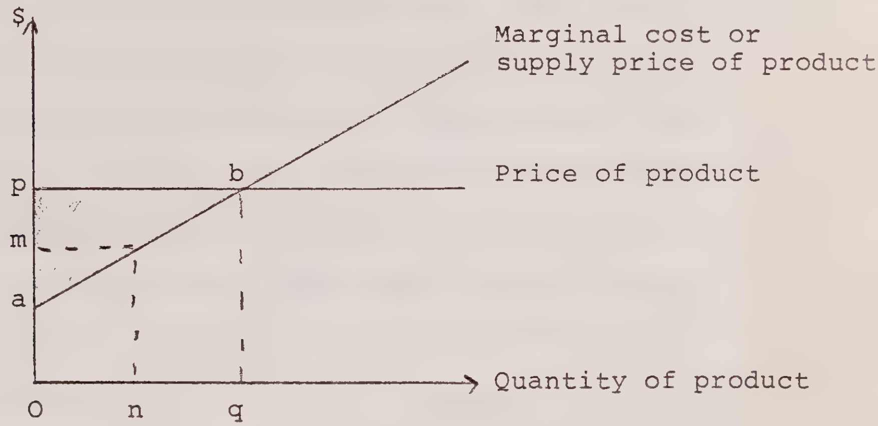
Taxes and royalties are fundamentally different in some respects, taxes being a unilateral transfer that are not part of the national income, and royalties being a purchase of property rights and a contribution to the national income. However, they are lumped together here because, especially given public ownership of natural resources, they are practically indistinguishable in their effects on the profitability and incentives of private firms.

Efficient resource allocation requires that any product be produced in the amount at which its marginal cost is equal to its price. For an internationally traded commodity, the relevant price is the world market price, even when that world price is the result of a cartel if the cartel is likely to persist. (It would be efficient to ignore a merely transient increase in

world prices in the planning of long-term domestic projects; but the OPEC cartel does not seem transient).

If markets are reasonably competitive, and if externalities are small, and if taxes or price controls do not distort private decisions, then profit-seeking firms will tend to bring about an efficient allocation of resources. In the process, they will create a flow of economic rent or producers' surplus, if their industry is subject to diminishing returns, in an amount illustrated by the shaded area pba in Figure 1.

Figure 1



In principle, each unit of product or say each barrel of oil has its own cost of production or supply price. Producers would produce the first barrel for only \$Oa, the nth barrel for only \$Om, and so on; only the qth barrel requires \$Op to call it forth. If every barrel is sold for \$Op, surplus revenue is generated (the shaded area pba), and this is the source of royalties or rent to the landlord. If the surplus were collected with perfect skill, at a different rate on every barrel,

100% of it could be collected by the landlord without disturbing the producers' incentive to produce Oq.

Unfortunately, such perfect collection of rent is not feasible. It would require exhaustive information and intimate monitoring of the producers' activities and costs by the landlord. Information and monitoring are expensive, prohibitively so as they approach perfection. The landlord must look for some device of rent-collection that will maximize his income net of collection costs, rather than his gross rent.

Very crude devices will work rather well in the short run in the case of production of crude oil, because the short-run marginal cost of production rises steeply, as in Figure 2. A simple percentage royalty on all production will not greatly reduce the volume of production from a given, already developed, number of fields and wells. That is, in the short-run of Figure 2, even a heavy rate of straight percentage royalty or tax may lead to only a small shortfall of q' below q. In the

Figure 2

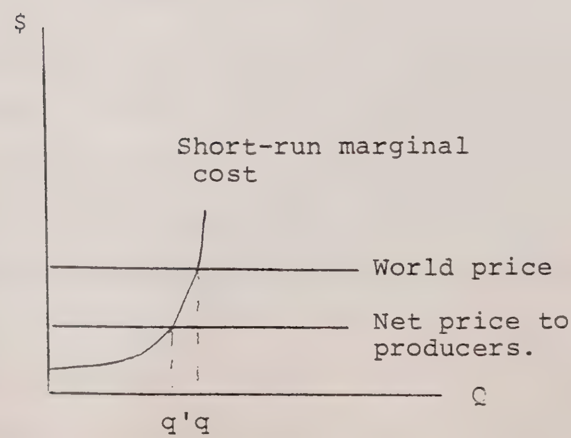
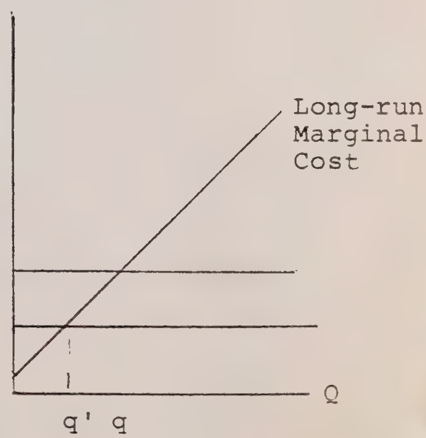


Figure 3



long-run, when cost of exploration and development must also be taken into account, Figure 3 is relevant and illustrates that a simple percentage royalty can cause a major shortfall of q' below q.

Artificial maintenance by fiat of a low domestic price has the same effect. In the short run, it benefits domestic consumers while causing only minor shortfall of production below its efficient volume. In the long run, it can be expected to have severe effects on production.

Sale by auction of mineral rights, and profit-sharing in lieu of royalties, are two devices by which a landlord may collect a substantial portion of the rent with moderate collection cost and without adverse effect on the volume of production. Do-it-himself production is of course a third, which means in the case of natural resources, publicly-owned producers. There is no perfect device for transferring rent from producers to government or to consumers, but fixed percentage royalty and price control are among the worst devices, in their effect on efficiency of allocation.

(b) Taxes or royalties and sources of finance.

Separate from and more controversial than the idea discussed above, that a firm must be able to expect a reasonable future profit as an incentive for new investment, is the idea that a firm must have a substantial accumulation of past profit as a means of financing new investment. The latter idea implies a need for much wider profit margins than the former one does. It is controversial because it throws against the usual presumption

in favour of more equal distribution of wealth the counter-argument that only concentrated wealth can or will undertake some socially important projects.

There are three possible arguments for abstention by government from some tax or royalty revenue in order to permit wider profit-margins for reinvestment by energy companies; the three will be considered in turn.

First, one could argue that households and governments collectively save too little, compared with the nation's needs for new savings, and, therefore, that it is necessary to add some "forced savings" to the national pool in the form of extra corporate profits, which, one would have to insist as part of the argument, must not be distributed as dividends. Canada uses foreign-owned savings to finance about one-fifth of its gross investment every year. This does seem excessive and a reason to take steps to increase domestic savings to reduce the growth of foreign debt. However, national saving could be increased, with less conflict with the goal of equity, in the form of reduced government deficits or increased government surpluses rather than in the form of increased retained corporate profits. (It follows from this point that increased government revenue from oil and gas should accrue to the government most likely to save it rather than dissipate it in subsidies or other current expenditure). Anyhow, even if extra corporate profits were judged an appropriate means, in principle, to reduce Canadian reliance on foreign-owned savings, they would not be an appropriate means in the oil and gas industry, where most of such extra profits would

themselves be foreign-owned. It is mere truth, innocent of chauvinism, to say that a country cannot increase its domestically-owned savings by giving extra revenue to foreign-owned firms for them to save.

A second possible reason for allowing private firms additional earnings, by reduced taxes or royalties, would exist if there are failings in the system of financial intermediaries. If the intermediaries fail, for any reason, to direct new savings toward the most desirable new projects, then society may have to permit the relevant firms enough internally-saved funds to finance these projects themselves.

As an extreme case of this argument, suppose there are no financial intermeidaries at all in an otherwise capitalist free-market economy. Then the only way any firm could expand its capacity would be from retained net earnings, and the only way any firm could use its retained earnings would be expansion of its own capacity. A shortage of any product would cause an increase in the price of that product, an increase in the retained earnings of that industry, and thus an expanded output by that industry. The system would succeed in adjusting production to demand, albeit more slowly than in a situation where funds could also be borrowed on the basis of expected profits without waiting for realized profits.

In a less extreme case, where financial intermediaries function well for most forms of investment projects but not for all, ample retained net earnings in the industry ill-served by intermediaries would be a means of correction of the financial market's failure.

I do not know enough about its financing to judge whether the oil and gas industry would qualify under this argument for tax or royalty relief. The high-risk parts of the industry (exploration, and development of new technology) presumably require a relatively high ratio of equity to debt, and Canadian financial intermediaries are often accused of aversion to equity and risk, whether justly or not. The argument is complicated by the usual objections to tax relief for the already affluent, by the fact of foreign ownership of a large portion of any relief provided, and by the need to appraise alternative means of coping with risk, such as joint ventures.

The third possible reason for tax relief to permit extra retained earnings to finance investment has to do with externalities, that is, benefits (or costs, but in this instance benefits) that accrue to third parties from an investment project although the third parties cannot be made to help pay for the project.
An analogy may be of interest here. Academic research is very risky, with a very high proportion of dry holes. But when a rich discovery is made, it cannot long be kept as the private property of the discoverer and is soon available to all users free of charge. The problem of risk might be privately overcome by various risk-pooling arrangements, but the fact of externalities means that no one group has enough private incentive to undertake research because it cannot capture all of the benefits from it. Both as a means of risk-pooling and because of externalities, academic research is subsidized by society through government, under arrangements in which the researchers themselves typically

bear none at all of the financial risk inherent in their activity.

Exploration and technological development in the oil and gas industry are also risky and likely to yield external benefits. They are, essentially, research. There is good reason to use public funds to pay private firms to do more of it than market incentives would encourage them to do. Relief from taxes or royalties is one way to do this. To an outsider, these forms of relief, such as depletion allowances or super-depletion, have a bizarre complexity. The rules no doubt provide the government some control over the direction of the research it is fostering, although one wonders whether there may be more straightforward ways of doing this. The main point is, however, that this rationale for extra corporate profits requires that the information discovered be made publicly available. This rationale is not disturbed by the fact of foreign ownership; research support should go to whomever does the job best, as long as the results are made public.

(c) Prices and consumer behaviour.

The need for restraint henceforth in consumption of oil and gas is best met in the long run by raising the consumer price of these items to world levels. The increase will cause hardship and opposition. The only relief here is that the increase need not be immediate to be effective, as long as there is an immediate clear knowledge that it will occur over two or three years. The reason is that, like production, consumption of energy is associated with large short-run fixed costs that make it insensitive to price in the short run. Therefore, immediate price increases

involve mostly extra expense with little conservation. But long-run increases, including clearly announced future increases, can cause a more effective conservation through changes in patterns of consumer investment in durables.

The following casual calculations illustrate the point. On a 200 mile drive, a driver might save at most 2 gallons of gasoline by driving at 50 m.p.h. instead of 65. By driving at the higher speed, he saves 55 minutes of driving time, which he values at, say $10. The 2 gallons of gasoline saved would have to cost more than $5 per gallon before the saving of gasoline would be worth more than the loss of time from slower driving. But this calculation is based on a short-run fixed item, namely, a given car. In the long run, the choice of a new car arises. Suppose the new car is expected to run 15,000 miles per year for five years. With a discount rate of 5% per year, the discounted present value of the fuel saved by a 30 m.p.g. small car compared with a 20 m.p.g. larger car is $1082 per dollar per gallon of gasoline, an amount large enough to weigh seriously in the choice. In other words, increases in the price of fuel affect consumption only with a delay while consumers "retool". Therefore, the hardship of immediate price increases is not necessary to conservation, as long as the increases are clearly announced so they can be taken into account in the "retooling" decisions.

Canada has been stretching its use of this source of short-run relief from more expensive energy. It is six years now since the first major increase in oil prices (in 1973) and we are still far short of world prices. A clear committment to reaching the

world price, say, three years, is overdue, for the sake of efficient planning by both consumers and producers.

3. Tax, prices, and equitable distribution of income.

As the figures in Part I indicate, a ten or twelve dollar increase in the price of a barrel of oil in Canada, together with associated changes in the price of natural gas, would transfer several billions of dollars a year from the rest of the economy to Saskatchewan and especially to Alberta. Even the present magnitude of oil revenues has led to questioning of the right of provincial governments to the income from their own natural resources. That questioning will become more severe as the price of oil rises toward world levels.

Sharing should be and is a basic feature of Confederation. This is not seriously in dispute. For example, Alberta's net provincial exports of oil and products in 1978 were 385 million barrels, and the Alberta economy received some $4.2 billion extra dollars by selling them at a price of around $14 instead of the pre-OPEC price of around $3. At the same time, the Alberta economy gave another $4.2 billion or so to the rest of the country by selling at $14 rather than at the world price of about $25. This is a roughly 50:50 sharing of the world price of oil between Alberta and the rest of the country, and all production costs and federal income taxes come out of Alberta's half. Debate about these arrangements is about the form and proportions, not about the principle, of sharing.

We need a rule for the sharing of provincial natural

resource revenue, to avoid the uncertainty and divisiveness of the present procedure of negotiated short-term compromises. W.D. Gainer and I have suggested such a rule, in Canadian Public Policy (Winter 1975), and I re-suggest it here with a little enlargement. Provinces should pay to the federal government the proportion of their natural resource revenue that would be paid in federal taxes if the natural resource revenue were privately owned. This rule should apply to all provinces and all natural resource. In the case of oil, it would replace present procedures for sharing, namely the differential between the domestic and the world price and the disallowance of provincial royalties in the calculation of federal corporate income tax.

The B.N.A. Act prohibits taxation of one government by another. But modern governments have two kinds of income. One is transfer payments, or one-sided transactions which do not create national income but merely re-allocate its ownership. Taxes are the prime example. The other is factor earnings, the result of two-sided transactions in which payment is made to purchase productive services and which are the original source of national income. Factor earnings consist of wages, rent, interest and profit. They are the ultimate tax base. In 1867, it was likely presumed that any government's revenues would consist almost entirely of transfer payments or taxes, and it was and is unwise to let one government tax another's taxes. But today, governments also earn substantial factor incomes from their various involvements in the economy, and there is no reason to exclude one government from part of the ultimate tax base merely

because another government happens to own it.

It is very difficult to amend the B.N.A. Act, but it would not be necessary to do so to change the effective rules. A negotiated agreement for "special payments" by the provinces to the federal government would suffice. Even that agreement would be difficult to achieve, but there do seem to be benefits to all participants to provide the incentive. The federal government would receive revenue. Alberta and Saskatchewan would receive a more stable and predictable set of rules for the sharing of oil revenues that they are obliged to share anyhow under present arrangements. The other provinces would receive the comfort of seeing an assured share of oil revenues go to the national government with little loss of their own rights to their own natural resources.

What factor earnings should be included in the agreement? Governments do not earn wages, so those are not at issue. Interest income raises problems. If interest income were added to a province's "taxable" factor earnings, then interest payments would be a deduction from them, and the scheme would in effect encourage provincial governments to run budget deficits by reducing the cost of doing so. It would therefore be sensible to adopt the crude but simple principle used in national income accounting and say that any interest on government debt is deemed to be transfer payment, not factor income. As for profit, the profits earned by government business enterprises are already subject to some intergovernmental payments of taxes or payments in lieu of taxes, so no new principle is involved in including them although tidying of the rules may be possible.

The main item, perhaps the only one big enough for urgent consideration, is rent in general and natural resource revenues in particular.

The actual rate of federal "tax" to apply to provincial factor incomes would be a central point for negotiation, as there is no clear answer as to what it should be. In principle, it should be the same rate as if the factor incomes were privately owned, but that principle is muddy in application because the rate would vary as the private owners were large or small corporations or more or less wealthy households, and as the revenues were considered to be income from renewable resources or capital gains from sale of exhaustible resources. At the upper end of plausibilities, one finds 36%, the rate of federal tax on corporate income after provincial tax credit. At the lower end, 14.5% is the average federal tax rate on everything, that is, the percentage that total federal tax collections were of GNP in 1978.

Movement to the world price of oil would have awkward consequences for the program of federal-provincial equalization grants because the effect on Alberta's provincial revenues would greatly raise the cost of the grants needed to bring all provinces up to the national average per capita provincial revenue. Plausible rates of federal sharing of provincial resource revenue would reduce but not remove this problem. To achieve sensible results from the equalization grants formula, it seems necessary to continue to remember that oil and gas revenues come from exhaustible resource and therefore are capital gains or even more liquidation of assets, and should not be included fully in

any regular current income account.

4. The price of energy and inflation.

One difficulty in moving the domestic price of oil to the world level is the aggravation by this move of the already serious problem of inflation. A ten-dollar increase in the price of the 660 million barrels of petroleum products used in Canada in 1978 would cost $6600 million dollars, which is about 2.8% of the 1978 GNP at market prices. That is, a ten-dollar increase in the price of oil would impose a direct 2.8% cost-push on the national price level, not to mention the indirectly resulting inflationary pressures from attempts of other sectors to catch up.

There is no escape from this difficulty. It is not even clear that a gradual increase in the price of energy would be less inflationary than an abrupt one, because of the volatile nature of expectations. That is, three annual cost-pushes of 0.9% each could create a more stubborn increase in inflationary expectations than one increase of 2.8%.

Suppose the domestic rate of inflation depends on four items, in this order of importance:

1. general expectations of inflation, based on past experience of it;
2. devaluation of the Canadian dollar, directly raising prices of imports and export-type goods;
3. the level of employment;
4. increases in the price of energy.

Nothing can be done directly about item (1). Therefore, if the price of energy is increased, there must be offsetting changes in items (2) and (3) to prevent aggravation of inflation.

There are two alternative general directions of macro-economic policy in response to an increase in the price of energy. One puts priority on resisting inflation, the other on restraining unemployment.

The policy that emphasizes resistance to the inflationary effect of higher energy prices would, first of all, maintain or strengthen the external value of the Canadian dollar to avoid or reverse cost-push from our foreign trade. The only way to do this in the short run is with tight money policy and domestic interest rates high enough to attract increased inflows of foreign capital. Thus one by-product of this approach to more expensive energy is more rapid growth of international indebtedness, and another is the depressing effect of higher interest rates on domestic capital formation. Unemployment would increase, also because of the tight-money policy through its effects on investment spending and on exports and imports via the exchange rate. It is quite possible that tax cuts (a stimulative deficit?) would be required to prevent unemployment from rising too far, although it would have to remain high until the inflation was controlled. The costs of more expensive energy, on this approach to fighting its inflationary effect, are greater international indebtedness and a more prolonged period of high unemployment before inflation is controlled.

The alternative emphasis in a macro-economic policy

response to higher energy prices is more inflationary but more attractive in other respects. The extra revenues from higher energy prices are a significant source of additional savings. Let these accumulate as fully as possible as government surpluses or reduced government deficits, without offsetting tax cuts, to increase the national savings. Then an easing of monetary policy, combined with the additional supply of loanable funds, would lower interest rates, with two further effects, one being a stimulus to domestic capital formation, and the other being a reduction in net borrowing from abroad. Reduced foreign borrowing would cause the Canadian dollar to weaken in foreign exchange markets, and this in turn would narrow the deficit between exports and imports. Employment would be stimulated by each of higher investment, higher exports and lower imports. Inflation would be aggravated both by higher employment and devaluation of the dollar, and further tax increases would possibly be needed to restrain aggregate demand and employment. The whole approach would have to be applied with moderation to avoid serious aggravation of inflation from the strong effect of the foreign exchange rate on the domestic price level. The cost of more expensive energy on this approach is more prolonged inflation, with some reward in the form of greater domestic savings from the energy revenues.

Appendix

This appendix is related to Part 4 of the foregoing paper. It describes a macro-economic model, of an illustrative nature, intended mainly for teaching if all goes well; it needs further work for that or any purpose. It is offered here in admittedly unpolished form as background because it does provide a fuller explanation of the argument in Part 4.

The model contains:

1. The money market, which provides a conventional LM curve.
2. The bond market, which contains among other things a desired relationship between bond holdings and income and the interest rate.
3. The foreign exchange market, under a regime of pure floating.
4. The commodities market, which however does not provide a conventional IS curve because of wealth-effects on savings and consumption. Indeed, the IS curve is redundant in this approach because aggregate demand is fully determined in the first three sectors.
5. A division of changes in nominal national income into changes in price level and changes in volume, by means of an equation for the rate of inflation that incorporates, albeit crudely, expectations, plus demand-pull along a Phillips curve, plus cost-push from exchange rate movements or from changes in the price of energy.

Following the description of the model itself, there is a description of some manipulations of it concerning the macro-economic effects of changes in the price of energy.

The money market

1. The supply of money in existence is 10 times BCB, the stock of bonds held by the Central Bank. A freely-floating exchange rate is assumed, so the foreign exchange reserves and changes in them are omitted.

   M = 10BCB

2. The demand for money is directly related to the level of income Y, and inversely to the real rate of interest IR.

   MD = 0.75Y/IR

3. The supply of and demand for money must be equal

   MD = M

4. From 1, 2, and 3, an equilibrium relationship between IR and Y is derived.

   IR = 0.075Y/BCB

The bond market

5. The stock of bonds in existence is the previous period's stock plus current additions from government deficits and from financing of new investment.

   B = B(t-1) + G - TAX + I

6. Tax collections come from the tax-rate on Y, TRY, applied to Y, and the tax-rate on energy, TRE, applied to QE, the volume of energy produced.

   TAX = TRY.Y + TRE.QE

7. New fixed investment varies inversely with interest rates,

and also tends to grow through time.

$$I = (35 - 3IR)(1.04)^t$$

8. From 5, 6, and 7:

$$B = B(t-1) + G - TRY.Y - TRE.QE + (35 - 3IR)(1.4)^t$$

9. There are five groups, described below, who contribute to BD, the total demand for bonds,

$$BD = BCB + BPB + BH + BC + BF$$

10. BCB, bonds held by the Central Bank, is an exogenous policy variable. BPB, bonds held by the private banks, are the only asset available to them other than cash reserves.

$$BCB + BPB = 10BCB$$

11. BH, bonds held by households, is determined by a process of partial adjustment toward a target level which in turn varies directly with income and the interest rate.

$$BH = BH(t-1) + 0.1(0.6IR.Y - BH(t-1))$$

12. BC, bonds held by the corporate non-financial sector, are used to represent retained net earnings, which arise only in the energy sector in this model and only if government policy allows. The policy variable CRE is corporate retained earnings per unit of volume of energy production.

$$BC = BC(t-1) + CRE.QE$$

13. BF, domestic bonds held by foreigners, varies directly with the interest rate and also tends to grow through time.

$$BF = 20IR(1.04)^t$$

14. From 9 through 13:

$$BD = 10BCB + 0.9BH(t-1) + BC(t-1) + CRE.QE + 0.06IR.Y + 20IR(1.04)^t$$

15. The bond market must clear:

$$BD = B$$

16. Derive from 8, 14 and 15 another equilibrium relationship between IR and Y:

$$IR = \frac{\left\{ \begin{array}{l} 35(1.04)^t + B(t-1) - 0.9BH(t-1) - BC(t-1) \\ \quad - 10BCB - QE(CRE+TRE) + G - TRY.Y \end{array} \right\}}{0.06Y + 23(1.04)^t}$$

The foreign exchange market

17. Exports vary directly with R, the price of foreign currency, and inversely with P, the domestic price level, and also tend to grow through time because of foreign real growth and foreign inflation.

$$X = 15R(1.10)^t/P$$

18. Rearrangement of 13 gives capital inflows into Canada, all of which consist of sale of bonds to foreigners.

$$BF - BF(t-1) = 20IR(1.04)^t - BF(t-1)$$

19. Imports depend simply on Y.

$$Z = 0.2Y$$

20. The foreign exchange market must clear, and there is no official intervention to help it do so.

$$X + BF - BF(t-1) = Z$$

21. From 17 through 20, derive the market-clearing exchange rate:

$$R = P(0.2Y - 20IR(1.04)^t + BF\ (t-1))/15(1.10)^t$$

The commodities market

The three previous markets fully determine the commodities market as well, so it is necessary here only to make explicit the determination of two variables that are merely implicit in that solution.

22. Private savings are equal to the acquisition of money and bonds by households and any retained net corporate earnings.

$$S = MD - MD(t-1) + BH - BH(t-1) + BC - BC(t-1)$$

23. Consumer spending is income less taxes and savings.

$$C = Y - TAX - S$$

Output, employment and prices

24. The labour force grows exogenously.

$$L = 40(1.02)^t$$

25. The stock of capital is increased by investment.

$$K = K(t-1) + I(t-1)$$

26. Full-employment output depends on the stock of labour and of capital and on technological progress.

$$QF = 1.6(1.014)^t L^{.7} K^{.3}$$

27. The current rate of inflation, %DP, depends on three influences. The first is expectations, determined by the previous period's inflation. The second is a Phillips curve, described by 12/%U - 2, where %U is the unemployment rate. The third is a cost-push that can be caused either by a rise in the price of foreign currency or by a rise in the price of energy.

$$\%DP = 0.71\%DP(t-1) + 12/\%U - 2 + 0.25\%DR + 0.04\%DPE$$

28. The present price level follows from 27:

$$P = P(t-1)(1 + \%DP/100)$$

29. The constant-dollar volume of real output is income at current prices divided by the price level.

$$Q = Y/P$$

30. The unemployment rate depends on the difference between full-employment output and actual output.

$$\%U = 100(QF - Q)/QF$$

31. For use in 27, the percentage change in the exchange rate is defined as

$$\%DR = 100(R - R(t-1))/R(t-1)$$

32. For use in 27, the percentage change in the price of energy is defined as

$$\%DPE = 100(PE - PE(t-1))/PE(t-1)$$

Energy sector

33. The volume of energy produced and consumed depends on Q.

$$QE = 0.04Q$$

34. The regulated price of energy consists of three components. One is ACE, the average cost of production of a unit of it. Second is CRE, corporate retained earnings permitted per unit of product of energy. Third is TRE, the tax rate per unit of volume produced. CRE and TRE are policy variables.

$$PE = ACE + CRE + TRE$$

35. The average cost of production of energy moves in step with inflation.

$$ACE = 1.093872P(t-1).$$

Solution of the model

The five central equations are 4, 16, 21, 28 containing 27, and 29. These five can be solved for IR, P, Q, R and Y. All other variables are then readily found by substituting these values into the other equations.

Summary list of variables

Policy variables:

BCB Bonds held by central bank

CRE Corporate retained earnings permitted per unit of energy production

G Government expenditure on goods and services

TRE Tax rate (including royalties) per unit of energy production

TRY Tax rate on national income, Y

Endogenous variables:

ACE Average cost of production of energy, excluding retained earnings and tax

B Total stock of bonds

BC Bonds held by corporations (or accumulated retained earnings)

BD Total demand for bonds

BF Bonds held by foreigners

BH Bonds held by households

BPB Bonds held by private banks

C Consumer expenditure

GB	Government bonds outstanding = GB(t-1) + G - TAX
I	Investment
IR	Interest rate (real rather than nominal)
K	Stock of capital
L	Labour force
M	Stock of money
MD	Demand for money
P	Price level
PE	Price of energy
Q	Gross national product at constant prices
QE	Volume of production of energy
QF	Full employment GNP at constant prices
R	Exchange rate, as home-currency price of foreign currency
S	Savings by households and business
TAX	Total government revenue
X	Exports
Y	GNP at market prices
Z	Imports
%DP	% change in price level, or rate of inflation
%DPE	% change in price of energy
%DR	% change in exchange rate
%U	% unemployment

Experiment One: Priority to fighting inflation

The model is given initial values that start it of at time =0 with 9.091% unemployment and 9.387% inflation. In the table labelled "Policy 1", the price of energy is not increased

except in lagged step with general inflation. In order to avoid any inflationary pressure from increases in R, monetary policy is used to attract enough foreign capital to hold the floating R steady. By itself this restrictive monetary policy seriously worsens unemployment, which is allowed to run close to 10% in the interest of fighting inflation, but substantial temporary tax cuts are necessary to prevent unemployment from becoming even worse. Inflation is knocked out of the system by about the end of time 4, after which new priorities for policy could be introduced but were not in the printout for "Policy 1".

In "Policy 5", taxes or royalties of 50% of ACE are imposed and added to the price of energy. Monetary policy must now be even more restrictive and interest rates and foreign borrowing even larger to hold the exchange rate steady. Even larger tax cuts are required to prevent the resulting unemployment from exceeding 10%. And this high rate of unemployment must persist for an additional two time periods before inflation is eliminated.

Experiment Two: Priority to savings

I have not run this one yet. It would be along the lines of the last paragraph in the text, using easier monetary and tighter fiscal policy to try to prevent the extra energy revenues from being more than offset by other tax cuts, all without too great inflation.

OUTP PRINTP 2×⍳5

TIME	BCB	CRE	G	TRE	TRY
0	1.500	.000	30.000	.000	.300
2	1.714	.000	36.215	.000	.233
4	1.844	.000	41.130	.000	.221
6	1.964	.000	44.702	.000	.247
8	2.158	.000	47.386	.000	.313
10	2.535	.000	49.567	.000	.417

OUTR PRINTR 2×⍳5

TIME	ACE	B	BC	BD	BF
0	1.000	278.000	.000	278.000	100.000
2	1.162	332.221	.000	332.221	114.245
4	1.232	395.551	.000	395.551	130.489
6	1.239	458.147	.000	458.147	143.969
8	1.210	509.179	.000	509.179	150.227
10	1.161	537.609	.000	537.609	144.738

TIME	BH	BFB	C	GB	I
0	163.000	13.500	55.000	35.000	20.000
2	200.833	15.429	71.470	48.085	20.719
4	246.625	16.593	82.661	69.037	21.372
6	294.535	17.680	87.726	87.038	22.691
8	337.368	19.426	87.152	88.888	25.366
10	367.525	22.812	81.049	59.792	30.098

TIME	IR	K	L	M	MD
0	5.000	243.278	40.000	15.000	15.000
2	5.281	283.694	41.616	17.143	17.143
4	5.577	325.420	43.297	18.437	18.437
6	5.689	368.696	45.046	19.644	19.644
8	5.488	415.203	46.866	21.584	21.584
10	4.889	467.997	48.760	25.346	25.346

TIME	P	%DP	%DPE	%DR	PE
0	1.000	9.387	9.680	.000	1.000
2	1.103	3.848	6.208	.023	1.162
4	1.135	.777	2.086	.012	1.232
6	1.122	¯.919	¯.196	.007	1.239
8	1.085	¯1.860	¯1.457	.002	1.210
10	1.036	¯2.394	¯2.163	¯.004	1.161

TIME	%U	Q	QE	QF	R
0	9.091	100.000	4.000	110.000	1.000
2	10.117	109.449	4.378	121.768	1.000
4	9.921	120.824	4.833	134.130	1.000
6	9.787	132.795	5.312	147.201	1.000
8	9.733	145.558	5.822	161.252	1.000
10	9.764	159.440	6.378	176.692	1.000

TIME	S	TAX	X	Y	Z
0	15.000	30.000	15.000	100.000	20.000
2	21.162	28.083	16.455	120.715	24.143
4	24.152	30.286	19.357	137.100	27.420
6	24.432	36.848	23.689	149.007	29.801
8	21.425	49.377	29.640	157.954	31.591
10	15.227	68.948	37.555	165.224	33.045

'POLICY5' MODEL 10
OUTP PRINTP 2x15

TIME	BCB	CRE	G	TRE	TRY
0	1.500	.000	30.000	.000	.300
2	1.721	.000	36.809	.580	.199
4	1.860	.000	43.249	.639	.155
6	1.938	.000	47.834	.658	.154
8	2.042	.000	51.173	.652	.192
10	2.243	.000	53.735	.632	.269

OUTR PRINTR 2x15

TIME	ACE	B	BC	BD	BF
0	1.000	278.000	.000	278.000	100.000
2	1.159	335.656	.000	335.656	115.659
4	1.278	409.725	.000	409.725	135.986
6	1.317	490.793	.000	490.793	156.182
8	1.305	567.293	.000	567.293	171.499
10	1.264	626.569	.000	626.569	177.307

TIME	BH	BPB	C	GB	I
0	163.000	13.500	55.000	35.000	20.000
2	202.785	15.491	73.745	51.845	20.507
4	255.136	16.743	90.794	84.829	20.547
6	315.235	17.438	100.524	124.416	20.859
8	375.376	18.375	103.980	157.394	22.175
10	426.832	20.186	101.582	168.025	25.213

TIME	IR	K	L	M	MD
0	5.000	243.278	40.000	15.000	15.000
2	5.347	283.582	41.616	17.212	17.212
4	5.812	324.626	43.297	18.603	18.603
6	6.172	365.795	45.046	19.376	19.376
8	6.266	408.001	46.866	20.417	20.417
10	5.989	453.609	48.760	22.429	22.429

TIME	P	%DP	%DPE	%DR	PE
0	1.000	9.387	9.680	.000	1.000
2	1.126	6.275	55.970	2.626	1.706
4	1.194	2.130	4.574	.217	1.894
6	1.202	¯.103	1.268	.040	1.970
8	1.177	¯1.352	¯.579	.014	1.962
10	1.132	¯2.062	¯1.620	.001	1.908

TIME	%U	Q	QE	QF	R
0	9.091	100.000	4.000	110.000	1.000
2	10.513	108.954	4.358	121.754	1.004
4	9.888	120.779	4.831	134.032	1.000
6	9.708	132.596	5.304	146.853	1.001
8	9.618	144.979	5.799	160.408	1.001
10	9.609	158.223	6.329	175.044	1.001

TIME	S	TAX	X	Y	Z
0	15.000	30.000	15.000	100.000	20.000
2	22.035	26.924	16.183	122.704	24.541
4	28.006	25.362	18.404	144.162	28.832
6	30.946	27.970	22.111	159.440	31.888
8	30.136	36.452	27.353	170.568	34.114
10	25.266	52.261	34.401	179.109	35.822

PREPARED FOR THE ONTARIO ECONOMIC COUNCIL ENERGY POLICY CONFERENCE

27TH-28TH SEPTEMBER, 1979

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TRADE POLICIES FOR NATURAL GAS AND ELECTRICITY

John F. Helliwell

1. Introduction

Table 1 shows the values since 1970 of net Canadian exports of various energy sources. I have been asked to deal specifically with natural gas and electricity, and hence to pass over the policy issues relating to oil, coal, and uranium. The distinction cannot be clear-cut, however, as natural gas and fuel oil are fairly close substitutes in a number of domestic uses, and exports of uranium, and to a lesser extent coal and natural gas, can be interpreted as exports of electricity at an earlier stage of processing.

The net export figures also mask the importance of transport costs and quality differences, which mean that gross trade flows can be large even if the net flows are not. For example, in 1978 gross coal exports (mainly of Western coal to offshore markets) were over 15 million tons, or 45% of production, offset by imports of 15.6 million tons of U.S. coal into Ontario and Quebec. For crude oil and products, exports to the U.S. were more than imports from offshore (in terms of the trade values shown in Table 1) during the first half of the 1970's, but both before and after that time imports have exceeded exports. By contrast, natural gas and electricity, the two commodities that are the subject of this paper, have tended to be exported with very few offsetting imports.

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* Comments welcome

TABLE 1

CANADIAN TRADE BALANCES IN ENERGY COMMODITIES

NET EXPORTS
(Millions of Dollars)

	Petroleum	Natural Gas	Coal & Coke	Electricity	Uranium	Total
1970	129	201	-135	22	- 34	183
1971	172	244	- 83	37	13	383
1972	344	299	- 90	59	55	667
1973	647	343	- 9	103	69	1153
1974	1045	488	- 84	170	83	1702
1975	171	1084	-160	91	121	1307
1976	- 624	1607	- 13	153	241	1364
1977	-1065	2028	- 66	362	208	1467
1978	-1427	2190	- 8	477	646	1878

Source: S.C. 65-202, Exports Merchandise Trade
S.C. 65-203, Imports Merchandise Trade

The data in Table 1 show that the many post-1973 changes in the prices and quantities of Canada's energy trade have caused individual components to vary a great deal, while the total balance has varied over a relatively narrow range, from a net energy trade surplus of $1.3 billion in 1975 to a high of $1.9 billion in 1978, with the 1979 surplus likely to be higher again.

Even in this introductory comment, it is necessary to qualify any statistics that treat the energy trade balance as a single revealing number. There is a temptation to regard the energy trade balance as a leading indicator of the strength of a country's currency (in the way that the U.K.'s emerging but temporary role as a net oil exporter has fuelled speculation in favour of sterling) or of the country's insulation against future disruptions in world supply, or further sharp price movements, of key energy commodities. Economists are fond of speaking of, and even estimating, the degree to which one form of energy can be substituted for another, and there is no doubt that such possibilities are substantial, especially over periods long enough to permit the development and adoption of technologies that make best use of an emerging pattern of energy prices and availability. However, the very different characteristics of the various traded energy commodities mean that the substitution possibilities are inevitably limited, that they will differ in the various regions of the country, and that they will be limited by the availability and costs of transport and storage. All this is a lead-in to my preliminary judgement that the institutions and economic factors governing the exports of electricity and natural gas are so different that each deserves a separate section of the paper to itself.

Before starting into those separate parts of the paper, I shall outline the key issues that relate to each type of export.

The first point to note is that natural gas exports have, during the 1970's, been from 40% to 50% as large as domestic consumption, while net electricity exports have ranged from next to nothing to a 1978 level that was under 6% of domestic consumption. Natural gas has been discovered and developed with export markets in mind, while electricity production tends to be developed to meet requirements within each province, with inter-provincial and international trade used in special cases (e.g., Churchill Falls), to help in the utilization of large and lumpy investments to capacity (e.g., James Bay), and to cut the costs of carrying systems that have been overbuilt because of long construction times coupled with overly large estimates of future demand growth.

A second key distinction between natural gas and electricity is that exports of natural gas inevitably involve questions of equity between present and future generations, because the faster use of low-cost deposits brings forward the time when higher cost sources will need to be tapped for domestic uses. The division of economic benefits between regions of the country, between resource developers and resource consumers, and between domestic and foreign residents is also more troublesome for natural gas than for electricity, because the natural gas reserves are 85% in Alberta, and the development, although subject to provincial royalties, is done by firms with an average foreign ownership of 75%.* By contrast, the main

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* PetroCanada now may have an important impact on the distributional effects of natural gas exports, as it has become, chiefly through the purchase of Pacific Petroleums, the second largest gas producer (after Shell) in Canada. Producer rents that rise through unexpected increases in export market

electrical utilities are either provincially-owned or provincially regulated to obtain only a normal rate of return, so that the natural resource values inherent in the advantageous hydro sites are passed on to either domestic electricity users or to domestic taxpayers.*

Finally, the decision about how much natural gas to export is intertwined with decisions about how far to extend the domestic distribution system, and the extent to which downstream processing should be encouraged to take place in Canada. For electricity, with the possible exception of Quebec in the 1980's, these issues have already been settled, with the provincial distribution grids already covering almost all the major centres of population. The resolution is less clear with respect to the subsidization of downstream processing. Although most electric utilities do not plan facilities for the export market, and do not view themselves as trading-off domestic and export sales as competing uses, it is true that many utilities do price their incremental industrial sales at less than incremental costs, and hence subsidize the production of electricity-intensive output, whether for sale in Canada or in foreign markets.

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opportunities or wellhead prices now accrue to Canadian residents to a larger extent than previously. Naturally, any expected profits from higher wellhead prices and higher export sales were already reflected in the prices that PetroCanada had to pay for Pacific Petroleums and its other properties.

* Except for the electricity generated from the few large privately-owned hydro installations and exported in the form of processed aluminium or some other electricity-intensive product. About 12% of Canadian electricity production in 1978 was generated by industrial firms, chiefly for their own use.

Having briefly listed some of the key issues in exports of electricity and natural gas, and made contrasts between the two fuels, I can now proceed to more detailed analysis on a separate basis. The natural gas section will be much the longer of the two, because there are many more open policy issues, because the size of the actual and potential export trade is much larger, and because there are many more conflicting interests in play.

2. Natural Gas Exports: Selling the Farm or Saving the Bacon?

2.1: Historical Background

Natural gas exports, pipelines, and export proposals have been key issues in Canadian energy policy since before there were any federal policies or institutions to implement them. The Federal Liberal government was defeated in 1956 on the basis of the methods they were using to obtain passage of bills providing federal financial support for the TransCanada Pipeline, and the Borden Royal Commission was established, in October 1957, by the new Conservative government to recommend on energy export policy, to recommend on the regulation of pipeline tariffs, to study the potential role for a National Energy Board, and to study some features of the financing and operation of TransCanada Pipelines.

The Royal Commission's First Report (1958) recommended that ".... the export from Canada of natural gas, which may from time to time be surplus to the reasonably foreseeable requirements of Canada, be permitted under licence." (p.1). They also concluded that "Due to accepted principles of pipeline financing and possible delays in construction, it appears to be necessary to grant export licences for a period somewhat longer than

20 years."* The Commission also heard evidence that Westcoast Transmission had contracts to sell gas to B.C. Electric (to service the lower mainland of B.C.) at 32¢/mcf while exporting gas to the U.S. at 22¢/mcf. This, the Commission heard, meant that "the operating profits of Westcoast were coming solely from the Canadian consumer and no profit was being made by Westcoast in carrying out the terms of its contract with Pacific Northwest" (p.23). Hence the Commission concluded that "the export contract should contain fair and reasonable provisions for price adjustments during the term of the contract, so that the exporter, and in turn the gas producers, will participate in any benefits accruing from general price increases occuring in the export markets." No concern was raised about the possible distribution of these higher wellhead values between resident and non-residents, or between the producing companies and the Crown.

In the light of the Commission's espousal of the principle of long-term gas export contracts, and the National Energy Board's subsequent acceptance and application of this feature, it became especially important to foresee far-future demands for Canadian gas consumption. Thus the Commission prepared estimates of Canadian natural gas demand and likely discoveries through the 1980's. The Borden Commission underestimated substantially the speed of the expansion of the Canadian market until the mid-1970's, probably

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* This is in contrast with the recommendation on crude oil, that "the export from Canada of crude oil be permitted under annual licence" (p.26). Since both exports are carried by pipeline, the difference in conclusion must have hinged on the greater role of exports in natural gas production. However, if the reason for cutting gas exports were to service domestic markets, shorter-term export contracts should not have adversely affected the ability to finance at least the main Canadian components of the pipeline system.

because they did not pay sufficient importance to the method by which pipeline tariffs are set. This conventional method charges each year's user straight-line depreciation (on an historical cost basis) plus a rate of return on the remaining rate base. This method produces a tariff which is highest in real terms at the beginning of the pipeline's life and declines thereafter. Thus it was that Westcoast contracted to sell gas to B.C. Electric at 32¢/mcf in 1958 and was selling gas to B.C. Hydro at 29¢/mcf in early 1974. This "front-end loading" may make financing easier to obtain, but it tends to increase the insistence of an export buyer on long term contracts for gas exports using new facilities, as no one likes to pay more than his share of costs in early years and then be denied access to the facilities during their under-priced later years. The conventional tariff formula was applied to all the main transmission and distribution utilities in Canada, which were mostly put into service in the late 1950's, and produced burner-tip gas prices that declined significantly, relatively to things in general and to other forms of energy, between 1958 and 1973. This helped to produce a more rapid penetration of natural gas than was foreseen by the Borden Commission.

In the following 13 years, the National Energy Board was established (in 1960) according to the Borden Commission's recommendations and proceeded to issue gas export licences, on a case-by-case basis. By the end of 1971, total export sales had cumulated to almost 6 trillion cubic feet (tcf) and future export commitments (on contracts expiring mainly in the late 1980's) were approximately 17 tcf. The latter total was reached when big new export approvals in 1970 added more than 6 tcf to existing export commitments, helping to set the stage for the mid-1970's period when there was a widely-shared industry and government perception that domestic demand and committed

exports had already exceeded, or would soon exceed, the available supply from non-frontier sources.

The mid-1970's regret and recriminations about past export commitments had several causes and several aspects. I have analyzed the events elsewhere in some detail,* so only a brief summary need be given here. In the simplest terms, the low prices of the early 1970's led to fast demand growth and a slackening pace of new supply additions. When world oil prices shot up in 1973-74, and there was a scramble for the current and potential windfall gains on low-cost natural gas deposits, it became apparent to many producers that it was more profitable to keep reserves in the ground than to invest in facilities that would permit faster production. This genuine element of supplier reticence was increased by uncertainty about the tax and royalty structure, by the continuing efforts of Trans-Canada Pipelines to use its monopsonist position to hold down wellhead prices in Alberta, and by physical deliverability problems in two major B.C. fields. These conditions of tightening short-term supply were exaggerated by those who were anxious to show Canadian need for Mackenzie Delta gas, or to make use of a perceived shortage as a lever to establish a more favourable tax and royalty climate.

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* See Helliwell (1975) for an analysis of the N.E.B.'s crucial 1974-75 gas supply and demand hearings, Helliwell (1977) for further evidence on the links between the domestic supply and demand situations and the frontier development proposals, and Helliwell (1979, pp. 199-206) for a retrospective survey. Kierans (1974) recounts the arguments used in cabinet when the 1970 expansion of exports was approved. Very similar arguments have been made during the current N.E.B. hearings.

In this artificial climate of natural gas shortage, there were many recriminations against the N.E.B. for accepting so many new long-term export commitments in 1970. There were also complaints, less widely heard, that the N.E.B. acted far to slowly in raising the natural gas export prices to match the value of new sources of competing fuels in export markets. In the event, the initiative on export prices came from the governments of British Columbia and Alberta.*

The established industry and N.E.B. view of shortage lasted as long as there were active Mackenzie Valley Pipeline proposals dependent on the proponents' ability to show such a need. Even as late as mid-1977, despite the increasing number of willing producers without markets, creating the so-called "gas bubble", the three main producer proponents of the Mackenzie Valley Pipeline were arguing:

> "... that there could be deliverability problems during peak demand periods as early as 1980 and an overall gas supply shortfall by 1982 or 1983 .... If the discovery rate for new reserves fails to live up to expectations or some of the presently connected pools fail to perform as expected, the shortage problem will present itself even earlier and in a more acute form."**

By this time some other natural gas producers were realizing that the strategy of using shortage to justify a Mackenzie Valley Pipeline would be likely to backfire, destroying the credibility of industry projections and making new export permits politically impossible to obtain. From this point of view, the N.E.B.'s selection of the Alaska Highway Pipeline over the Mackenzie Valley proposals provided a partial solution, as the Alaska

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* The mechanisms used are described in Helliwell (1979, pp.188-189).

**From pp.5-6 of Final Argument Submitted on Behalf of Gulf Oil Canada, Imperial Oil, and Shell Canada, to the N.E.B. Northern Pipeline Hearings, June 1977.

Highway proposal did not require the use of Canadian gas and was not dependent on the demonstration that frontier gas would soon be needed for domestic use.

Even so, the general public has probably reacted with a mixture of puzzlement and cynicism to the current batch of export applications, totalling over 9 tcf, which would represent, if they were all approved, almost a doubling of the remaining quantity of committed exports.

Before turning to the issues surrounding these proposed export expansions, are there any lessons to be drawn from the earlier experience? In retrospect, and in light of possible changes in circumstances, it was probably unnecessary and impudent to make export contracts for such long terms, especially when, as in 1970, the main transmission facilities were already in place. Second, the experience shows that some form of export price regulation seemed to be necessary to obtain full value for gas exports, at least during those periods when new high-priced contracts could not come into force to trigger the contract clauses that would have raised other prices to match. The experience with the early contracts between Westcoast and its export customers, and the mid-1970's buying practices of TransCanada Pipelines in Alberta, illustrate monopsony that can only be offset by countervailling powers at the provincial or national level.

Third, the substantial swings in industry and regulatory views about current and future demands, supplies, and costs of natural gas suggest that the arbitrary calculations used to protect future Canadian users contain a large subjective element. To some analysts, this is a good thing, as it permits constructive imagination to be used instead of expensive labour and capital in establishing proven reserves far in advance of the

required date of production. To others, the unsubstantiated swings in opinion that supported new exports in 1970, new frontier sources for domestic use between 1973 and 1977, and major new exports in 1979 destroy the credibility not only of the formulae used to protect future Canadian consumers but also of the producers and of the government agencies established to hear their evidence.

Finally, as a prelude to considerations of the current export proposals, it is worth noting that the price that was deemed just and reasonable for Canada's natural gas exports in early 1974, (33¢/mcf) is one-tenth of the export price in effect since August 11th, 1979 ($2.80 U.S./mcf, equivalent to $3.30 Can if $.85 U.S. = $1.00 Can). Even after an allowance is made for general inflation, whether measured by the Consumer Price Index, the GNP deflator, or the price of Canada's imports (including imported oil), the real rate of increase in the gas export price has been more than 35% per year, compounded annually. If the gas exported in 1972 and 1973 alone, under just the new licences issued in 1970, were sold at today's prices rather than the actual prices it would be worth almost $3 billion instead of the less than $300 million actually obtained. In the dazzling clarity of hindsight, that gas would have much better been left in the ground. If one thinks of the value of the gas in terms of btr equivalence with Canadian light crude exports today's prices of about $30 Can per barrel,* the export value of the gas sold at 33¢/mcf should now be $5/mcf.

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* This was the export price of Canadian light crudes in August, 1979, comprising a wellhead price of $13.75, an export levy of $15 per barrel, and transport charges of about $1.25/barrel.

2.2: The 1979 Export Proposals

In July and August of 1979, the N.E.B. held export hearings involving a variety of new export proposals, almost .8 tcf per year, an expansion of about 80% on the current flow of approved exports. The total amount of gas covered by the applications is about 9 tcf,* to be compared with end-1979 export commitments of about 10 tcf on existing export contracts.

By far the biggest application is by Pan-Alberta Gas, to export .38 tcf/year for up to 15 years, with firm approval requested for the first five years and conditional approval requested for the rest. The split

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* The exact size of the proposals is difficult to measure, as some of the applications have been partially amended during the course of the hearings and the total of requested annual export flows is in some cases greater than the total term volume of exports for which approval is requested. The requested annual flows between 1980 and 1995 total 10.2 tcf, of which 5.6 tcf is the Pan-Alberta prebuild proposal, .77 is the ProGas export proposal, .65 tcf is near-term licence extensions (by Westcoast and TransCanada) from 1980 to 1985, 2.2 tcf is far-term licence extensions (chiefly by Westcoast and by Alberta and Southern) between 1986 and 1995, and five smaller applications totalling about 1.0 tcf. The total term volumes requested add up to 8.8 tcf, with Pan Alberta at 4.9 tcf, Westcoast at .85 tcf (instead of 1.6 tcf), with the rest of the applications being consistent with the requested annual flows. The flow totals are now greatest because Pan Alberta has lengthened its request from 13 to 15 years, and Westcoast's flow data are larger because of a further two year extension and because there is almost .25 tcf of accumulated delivery shortfall under the existing export licence.

between conditional and unconditional export approvals reflects the new N.E.B. export policy laid out in the February 1979 gas report. The export approvals at the beginning of the decade were for long fixed terms, and depended on the existence of adequate reserves under contract to cover the export contract plus the applicant's ability to show that total Canadian proven reserves sufficient to cover all export commitments plus 25 times estimated Canadian demand 4 years ahead. The new policy differs from the old in significant respects. First, there is now explicit account taken of expected future deliverability, by means of two types of test. The current deliverability test requires that production from existing established reserves be adequate to cover forecast domestic demand plus authorized exports for a minimum of five years into the future. The future deliverability test requires that expected deliverability extend to 10 years or more, but allows estimated future reserve additions to be used when forecasting deliverability. Finally, there is a straight reserves test, requiring established reserves to equal 25 times the current level of Canadian demand plus authorized exports.

If the reserves test plus both deliverability tests can be passed on the basis only of currently established reserves, then the N.E.B. may issue a firm export licence. To the extent that future reserve additions are relied upon when meeting the future deliverability test, the N.E.B. will provide a conditional approval that can subsequently be rescinded or reduced if actual domestic demand growth is higher than forecast or if actual reserve additions are smaller than forecast.

The net effect of the changes in N.E.B. export criteria is to reduce the amount of reserves that have to be in established form while decreasing substantially the likely term of firm export contracts. This should have the effect of reducing the waste involved in establishing well-head

production capacity long before production is required, and of decreasing the risk that supply or demand surprises (or self-serving forecasts) could cause supply shortages for Canadian gas users.

Without restricting its own subsequent freedom of judgement or the pending export applications, the N.E.B. gas report of February 1979 included example calculations that suggested about 2 tcf would be available, under its new tests, for new export applications spreading over 5 to 8 years. However, since that time the Alberta Energy Resources Conservation Board (A.E.R.C.B.) has lowered its own period for Alberta production from 30 to 25 years, thus increasing the N.E.B.'s probable estimate of surplus, because the N.E.B. calculations take account of amounts reserved by Alberta for its own requirements.* In addition, most of the producers and the A.E.R.C.B. have increased their estimates of reserve additions and deliverability, and the N.E.B. is likely to follow suit. Thus it would not be surprising if the N.E.B. now were to conclude that there were 4 to 5 tcf of reserves available for export permits with perhaps half of that on a firm basis.

Because it is unlikely that the N.E.B. will alter its new tests before they have been applied, and because there are limits to how much "new" evidence can be said to have come available in a six-month period, the Board is unlikely to approve much more than half of the additional export volumes requested. The key issue is how the Board will or should

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* British Columbia, the other main gas-producing province, has no formal procedure for protecting its own requirements, although the government does sometimes appear in the N.E.B. hearings. In the current hearings, the B.C. government is supporting Westcoast Transmissions bid to have its export authorization raised by 8% to about .3 tcf/year, and extended to 1995.

deal with the request to dedicate 5 tcf or more of Canadian gas to support the prebuilding of the southern legs of the Alaska Highway system. Some participants at the hearing have argued that the term of the Pan-Alberta permit be limited to 5 years (and hence the pre-build export total to 1.9 tcf) lest the U.S. customers be tempted to defer building the rest of the line to Alaska. Pan-Alberta, on the other hand, argues that a longer term is required to insure the financers of the southern legs against the possibility that the Alaska gas is never connected for delivery. A third view is represented by a rival group of gas producers* arguing that the use of Canadian gas to support pre-building of the Alaska Highway pipeline simply benefits the Alaskan producers (and eventual U.S. consumers of Alaskan gas) at the expense of Alberta producers. This cross-subsidy arises from the conventional tariff formula that overcharges early relative to later users of a pipeline system, and hence inclines short-term exporters to hitch a ride on existing pipelines rather than be the first users of a new facility.

No discussion of the export possibilities would be complete without some discussion of demand conditions. From a national point of view, the setting of export quantities and export prices cannot be done independently, although the present procedures split the two elements in a way that hides the essential interpedendence of prices and quantities. The current procedure is to set export maxima in the first instance, with prices then

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* The ProGas consortium, represented, ironically enough, by the ex-president of Canadian Arctic Gas Pipeline Ltd. (C.A.G.P.L.) which lost its bid for a Mackenzie Valley pipeline partly through its inability to argue convincingly that frontier gas was needed urgently to meet Canadian demands.

subsequently set, at least in principle, so that the purchasers are indifferent between the imported gas and their next best alternatives. In the past, the N.E.B. tended to keep export prices low enough that there was still excess demand at the permitted export maxima. The current export price of $2.80 U.S. and the likely end-of-year price of $3.30 U.S. are 65% and 75% of the btu-equivalent prices of Canadian light crude exports to the United States.*

Although the Canadian natural gas export price is, and is likely to remain, below the btu-equivalent price of U.S. oil imports, both prices have risen dramatically in the past year or two, in a way that is likely to spawn new energy-conserving efforts, accompanied in all likelihood by a slackening in U.S. GNP growth. In addition, U.S. natural gas prices are being progressively deregulated, thus reducing the extent to which U.S. users can be cushioned from the high costs of imported gas by having its cost "rolled-in" with the costs of U.S. gas. All of this will increase domestic U.S. supplies of natural gas, and decrease U.S. demands. However, in this post-Iran period of world oil uncertainty, it is likely that U.S. policy, like Canadian policy, will encourage the use of U.S. (or Canadian) gas instead of imported oil. In the meantime, however, there is some uncertainty about

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* In Canada, the Toronto city-gate price of natural gas is about 85% of the btu-equivalent price of Canadian crude oil delivered to Toronto. Past federal policy has been to remove this price preference for natural gas, but increasing domestic gas supplies and tighter world oil markets are likely to tilt this policy towards maintaining the discount, and even deepening it in markets where Canadian gas might be substituted for imported oil.

the potential export demand for Canadian gas. One export applicant, albeit a small one, withdrew his application in the light of demand uncertainty, and the main U.S. purchaser of B.C. gas, who was relieved of the contract's "take-on pay" provisions when there were shortfalls in B.C. deliveries, has been using B.C. gas for winter peaks and taking far less than the permitted amounts during the summer months. From the Canadian point of view, it is important to choose the combination of export quantities and prices that is consistent with the realities of the export market and maximizes the present value of net Canadian benefits from the export sale. The various cost/benefit studies submitted by participants to the 1979 gas export hearings do not fully account for demand conditions, presumably relying on the assumption that the combination of export price and permitted exports will be such that there is an excess demand for gas exports. But from the national point of view this is not the right way to approach export policy, as under excess demand conditions a higher export price would unequivocally increase net Canadian benefits.

Given the uncertainty about the feasible combination of export prices and volumes that would be consistent both with U.S. demand conditions and with assured future supply for Canadian users, it is difficult to estimate the revenue possibilities from export sales. Nevertheless, some example calculations may be useful to give some impression of the magnitude of the export proposals. If the N.E.B. were to approve .5 tcf/year for five years, and if the gas were priced at \$3.90/mcf (equal to the proposed end-of-year price of \$3.30 U.S. at \$.85 US = \$1 Can), the annual addition to export revenues would be almost \$2 billion, equivalent to almost 1% of GNP, or one-third of Canada's likely current account deficit for 1979. At the btu-equivalent price of \$5/mcf, .5 tcf/year would produce \$2.5 billion per year in export revenues, and the pre-build export volumes alone would

produce almost $2 billion per year. This would not be the whole of the direct effect on the current account, however, as a substantial portion of the revenues would flow back to the credit of the foreign shareholders of the gas-producing firms, on either a current or deferred basis.*

In any event, the proposed export sales are large enough, and potentially lumpy enough, to have a major impact not only on the measured current account deficit, but also on exchange rate expectations, the current value of the exchange rate, and on the prices and profits of importers, import-competitors, and other exporters. I shall return briefly to this issue after discussion of alternative uses for the gas, and of the likely costs and quantities of future gas supplies.

2.3: Alternative Domestic Uses

One of the emerging issues in current Canadian energy policy is the best method of insulating Canada from some of the current price and availability uncertainties of the world oil market. In the absence of these uncertainties, which have in most perceptions grown over the past

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* The links between the profits of foreign-owned firms and the current account of the balance of payments are complicated in two ways. The Canadian statistics (unlike the Australian and U.S. figures) include only dividends to foreigners in the service imports, while it would be more accurate to include all profits accruing to foreigners as an import of services with reinvested earnings shown as a capital inflow. Second, the very large tax incentives offered for re-investment of oil and gas profits mean that book profits and current federal tax receipts are artifically low, with the firms acquiring net assets in the form of new oil and gas reserves and the federal and provincial governments acquiring deferred tax claims.

year, then there would be no reason to link natural gas export policy to oil import policy. If both products were sold at their world prices, then, with some qualifications based on foreign ownership, the nature of the tax and royalty system, and the non-renewable nature of low-cost oil and gas deposits, the maximum advantage of Canadian energy resources would be obtained if surplus natural gas were exported and oil deficits were covered by oil imports, if indeed that were the nature of the Canadian balance at world prices.

However, it is increasingly apparent that the stability of the world economy over the next decade will depend importantly on its ability to reduce demands for OPEC oil. Although the benefits of any one country's oil import reduction, or increases in its oil import flexibility, are shared among all oil importers, even the benefits for individual countries from their own actions may be great enough to justify some investment in flexibility of supply and demand, even without the assurance of corresponding investments by other oil importing countries. The rises in oil prices over the past year, and their continuing unpredictability, have increased the return on energy conservation, energy production from alternate sources, and the extension of distribution systems for alternate fuel sources. Hence it is necessary to reassess the various proposals for using additional natural gas in Canada before approval is given to any export commitments that might jeopardize preferred Canadian uses. I shall consider four principal types of incremental Canadian use, along with their implications for oil imports and natural gas exports.

2.3.1: Natural Gas to Eastern Quebec and the Maritimes

There are two main schemes in play, the Q & M pipeline proposed by Alberta Gas Trunk Line and the TransCanada Pipelines plan to extend gas service eastward to Quebec City and the eastern townships, to build

distribution systems in some Maritime cities, initially fuelled by propane, with the option of later filling in the intervening transmission line if warranted by either eastward or westward flows. The Q & M proposal is essentially predicated on eastward flows of Alberta gas, with successively smaller transmission lines as the system approaches its Maritimes terminus. The TransCanada proposal is more focussed on the possibilities of production from natural gas deposits now being explored in the Sable Island area, and hence would imply transmission line sizes as suited to westward as to eastward flows between Quebec and the Maritimes. The major multinational gas producers with long purses and substantially connected deposits are sceptical, especially of the Q & M proposal, because the likely Maritimes volumes are not large enough to support a transmission system without a large explict or implicit subsidy from either producers or governments. Unconnected producers, especially the smaller firms with more drilling prospects than borrowing power, are much more prepared to take on the incremental sales at a discount price, especially if (as suggested by Robert Blair of A.G.T.L.) the cost of the discount is shared among all producers by raising the pipeline tariff levied on all Alberta gas sold in all markets in Ontario and Eastward.

From a logistical point of view, the TransCanada proposal has more flexibility, and proceeds by stages, each of which provides more information about the costs and benefits of the succeeding states.*

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* The idea of using an attenuated or stretched-out project as a way of learning-by-doing has been advocated recently by Scott and Campbell (1979). Their analysis relates chiefly to the choice between attentuation and postponement of ways of mitigating the environmental and social impacts of large-scale resource projects in frontier areas, but is equally applicable to

In any event, the earmarking of adequate Western Canadian reserves to serve the Eastern Canadian and Maritimes market is almost surely a prudent move for the N.E.B. Even despite the possibilities that the project will or should not proceed on the scale envisaged by Q & M, and that sufficient gas should be discovered in the Sable Island area, the amount required to assure supply is substantial enough (estimated by the N.E.B. to reach 160 bcf/year by 1995) that several tcf would have to be notionally put aside to cover these possibilities. It has been calculated that a subsidy of about 60¢/mcf (1979) prices) would be required to make natural gas sufficiently competitive with oil products to attain the market share for natural gas forecast by the N.E.B. How do the economics of this compare with the economics of incremental exports? Assuming that the future real price of world oil were to remain at its present level, almost $30 in terms of 1979 Canadian dollars, then the btu-equivalent natural gas price would be $5/mcf. This suggests that export sales would be economically preferable to use in Quebec and the Maritimes only if their price exceeded $4.40/mcf ($5 less the 60¢ subsidy required for marketing in Eastern Quebec and the Maritimes). There are some qualifications to be made. First, some of the energy sources that are alternative to natural gas in Quebec and the Maritimes (whether conservation, coal, residual fuel oil, or Quebec electricity) may have an opportunity value less than the $30/barrel price of world oil. Thus the required subsidy may be greater than 30¢/mcf because the projected gas sales volumes may not take due account of energy conservation possibilities) and the comparable export price less than $4.40. On the other hand, the subsidy calculation may be predicated on

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projects that can be subdivided into a sequence of stages that can be revised or cancelled in the light of emerging information.

the usual "front-end loading" of pipeline tariff charges, and hence be overstated, and it is probably appropriate to allow some premium for natural gas in terms of security of supply, and the consequential ability of Quebec and the Maritimes to accommodate disruptions in world oil supplies.*

2.3.2: Natural Gas to Vancouver Island

The basic idea of the proposal here is the same as for the Q & M proposal. However, the logistics are such that a substantial volume of sales would be needed to justify the underwater transmission line, and the only substantial users of fuel oil on Vancouver Island are the six large pulp and paper mills. At oil and gas prices far below world prices, even at current Canadian domestic prices, it is economically worth while for the mills to substantially increase their use of wood wastes as "hog fuel" to replace fossil fuels and to cogenerate electricity. At world oil prices, even forest residuals become worth gathering to supplement normal mill supplies of wood wastes. Given that the Vancouver Island pulp and paper mills should not, and probably would not, be major users of natural gas even if it were available, the costs of supplying natural gas to Vancouver Island become very great, and the volumes so small that there is no longer any important link between the Vancouver Island proposal and the amount of gas that needs to be set aside to supply future Canadian needs.

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* It is worth noting, however, that temporary stoppages in imports of oil may be more efficiently and completely insured against by stockpiling Alberta oil (perhaps shipped "under bond" on a marginal transport and pumping cost basis when there was unused wellhead and pipeline capacity) in underground storage rather than by installing a natural gas pipeline that relies for its economic justification on continuous use.

2.3.3: Natural Gas as a Petrochemical Feedstock

I have analyzed elsewhere (Helliwell 1979, pp. 216-219) the rather shaky economics of the so-called "world-scale" petrochemical projects using Alberta natural gas. The key problem with these projects is that they take a feedstock with a high value in alternative uses, already connected by pipelines to secure markets, and use a great deal of capital and a small amount of labour to convert the gas into petrochemicals for which the world markets are very cyclical and frequently in heavy excess supply. Some of the processes, especially the conversion of natural gas to methanol, are best regarded as converting natural gas to a form that is more easily transported, and perhaps more easily passed through export barriers, if not through U.S. anti-dumping levies. As such, they are likely to have their most economical application in regions where the feedstock is far from market access, and has a low opportunity cost. The Middle East, where much natural gas is now being flared off, provides a key example, but there are many other countries, ranging from New Zealand to Pakistan, that have discovered gas reserves far from suitable markets and are contemplating gas-based petrochemical projects as a means of overcoming the high cost of shipping natural gas in its natural state. Within Canada, petrochemical developments have been responsible for almost all the net growth that has taken place since 1976 in industrial sales of natural gas in Canada, and it is hard to imagine further expansions representing the best available use of the well-located low-cost gas deposits in Alberta. It is possible to conjecture that small scale plants may eventually be used to minimally convert natural gas to more easily transportable products in circumstances where gas deposits are too small and too far from existing markets to merit pipeline construction. In the longer term, it is likely that the most profitable and secure basis for petrochemical expansion in Canada will

involve the use of heavy oils, coal, and oil sands as feedstocks. Petrochemicals would be obtained as principal joint-, or by-products of the extraction and conversion of these energy forms, the Canadian supplies of which are hundreds of times greater than those of conventional natural gas. My hunch is thus that further petrochemical developments based on existing non-frontier natural gas depsoits are not economically strong competitors against the alternatives posed by export markets, other domestic uses, or retention for the use of future generations.

2.3.4: Increased Use of Natural Gas in Established Market Areas

The key mechanism exployed in this strategy is that of relative prices. Gas distribution utilities have long known which were the price-sensitive users, and have used their rate structures to keep the high-volume price-sensitive industrial users. During the mid-1970's, the situation altered somewhat in the face of escalating costs of gas supply, uncertainty about the extent and timing of new supplies, and the glut of heavy oil. The latter glut was caused by industrial slowdown coupled with rigid refinery structures that were not capable of shifting quickly to producing a higher proportion of motor fuels and a smaller proportion of residual fuels.

At the current time, there are some industrial users close to the margin between fuel oil and natural gas, and in some regions of the country (some parts of British Columbia and Quebec) the ability of natural gas to capture new residential heating is threatened by low-priced (but not low-cost) electricity.* In other parts of the country, uncertainty about future oil

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*Inland Natural Gas (1978) reports that in the part of its service area supplied with electricity by West Kootenay Power and Light, at a residential price of 1.1¢/kWh, half of the new residential construction uses electricity

supplies, and the continued existence of a relative price advantage of natural gas over furnace oil for most residential users, has raised the prospect of widespread residential conversions from oil to natural gas.

The difficulty in domestic natural gas pricing policy is to find some mechanism that conserves natural gas for its best uses, while recognizing that the concept of "best use" is relative, depending on the location and costs of alternative energy sources. The complete deregulation of natural gas prices, providing each potential producer the right to contract with a final user, and to obtain the services of gathering, processing, transmission, and distribution on a common carrier basis, is one solution that has been advocated. The objective would be to reduce oil use and to convert shut-in would-be producers into either producers or content investors in non-producing reserves. The mechanics of getting from here to there are by no means clear, given the present institutional set-up whereby the gas distribution utilities sell gas and distribution services as a package, with the overall average rate of return subject to regulation. More easy to envisage is the possibility that the present system of federal regulation of the Toronto city-gate price would lapse, to be replaced by Alberta determination of an Alberta border price (just as there is federal determination of the border price of exports from Canada), with downstream

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rather than gas for central heating. Their own average 1979 rate for residential gas is $2.23/mcf. These two prices provide more or less equivalent heating bills for the residential user. If electricity were priced at its marginal cost in British Columbia, more than 2.5¢/kWh in terms of 1979 prices, and if gas were sold at its current export value (even if that is assumed to be $4 or more), the residential customer would have a clearer preference for natural gas for space heating, and both forms of energy would be used more efficiently.

utilities setting prices just as they did prior to 1974. Even more likely is that the federal government would, in the short term, provide some continued discount on a btu basis, perhaps even larger than the 15% now applying at the Toronto city gate.

The key problem with using an explicit policy of price discounting for natural gas as a means of cutting oil use is that the primary effect is to increase total energy consumption, with the consumption of natural gas being increased far more than the consumption of crude oil is decreased. The waste involved in this strategy becomes even greater if the domestic price is pushed significantly below the price available in export markets. However, as shown in Helliwell (1979, pp. 197-8), the fact that lower domestic prices are paid principally by Canadians, while the after-tax profits from higher-priced sales fall three-quarters to foreigners means that in some circumstances the distributional effects can more than offset the costs of the wasteful use, as seen from the point of view of Canadians.

The waste from underpricing is especially great in the producing provinces, where gas is sold to provincial users at a price far below the export price. In British Columbia, for example, the wholesale price of $1.17/mcf is about one-third of the current export price. This leads to such anomalies as the use of natural gas to dry coking coal before export, even though the firms could apparently save money by using their own coal at prices above $1.60/mcf, less than half the current export price.* Similar waste arises in the use of natural gas to generate steam in pulp and paper

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* This reflects the fact that the export price of coking coal, per effective btu, is far less than that of natural gas. In addition, of course, the coal is already at the site. See Canadian Resourcecon (1978, p. 86).

mills that could and should be making greater use of their own wood wastes. A second problem with using discount pricing to encourage more domestic use is that the key competition in the industrial market comes from residual oil, and the result could be to worsen the current problems of relative excess supply of that product.

The above discussion suggests that the market pressures of temporarily surplus gas, the policy goal of cutting oil use, and distributional goals, are all likely to favour the use of discount prices to increase gas use in traditional markets. However, the overall policies of moving toward world prices, and of using energy efficiently, are likely to restrict the scope of the discount (except in the possible new market areas discussed earlier) and hence the volume of extra gas required.

2.4: Gas Supply and Costs

Perhaps the most important, and certainly the most uncertain, element in the formation of a rational gas export policy is the cost curve for the discovery and production of additional services of non-frontier natural gas. Whether the N.E.B's deliverability and reserves tests can be passed depends primarily on the fairly well understood properties of established reserves, with some additional information required, in the case of conditional export approvals, about reserve additions over the following few years. But the decision about whether exports should be expanded at all, and about the reservation prices that should be set for export contracts, depends on the much less well understood cost conditions for exploration and production of natural gas, and of substitute fuels, over a much longer horizon. The extent to which expanded domestic use and additional exports should be regarded as competing uses for the available

quantity of uncontracted exports depends crucially on the extent to which exploration and production costs, in real terms, are likely to rise in the future. If the cost curve, measuring full cycle costs per mcf against the quantity of reserves discovered, is fairly flat over an extended range of reserve additions then there is less competition between exports and expanded (or future) domestic use. Curves A and C show two possibilities, curve A representing a view consistent with that in the N.E.B. February 1979 gas report, and curve C representing a view consistent with the view espoused by Canadian Hunter, the firm that originated the research and exploration drilling in the Elmworth and Wapiti fields, and elsewhere in the so-called "Deep Basin" of northern Alberta and British Columbia. The vertical line at 115 tcf shows the estimate of ultimate non-frontier reserves made by the N.E.B. in 1974-75. The shaded vertical area represents the probability range of ultimate reserve estimates made by the N.E.B. in its February 1979 Report. Neither of the two N.E.B. reports made any explicit estimates of the price-responsiveness of the ultimate stock of economically recoverable reserves, but curve A is consistent with the wellhead price assumptions in the 1979 report.

Curve B shows what happens to costs if there is an exogenous, or perhaps time-dependent technical advance that increases the total quantity of recoverable reserves for any given expenditure. What is the link between this kind of technical progress and the rate of development for export? In general, the higher the rate of such exogenous or time-dependent technical progress, the more it pays to defer development, so as to reduce the proportion of reserves developed with square wheels. Therefore, it is important to distinguish between technical advances that are closely related to scientific developments in general (or to drilling technology in

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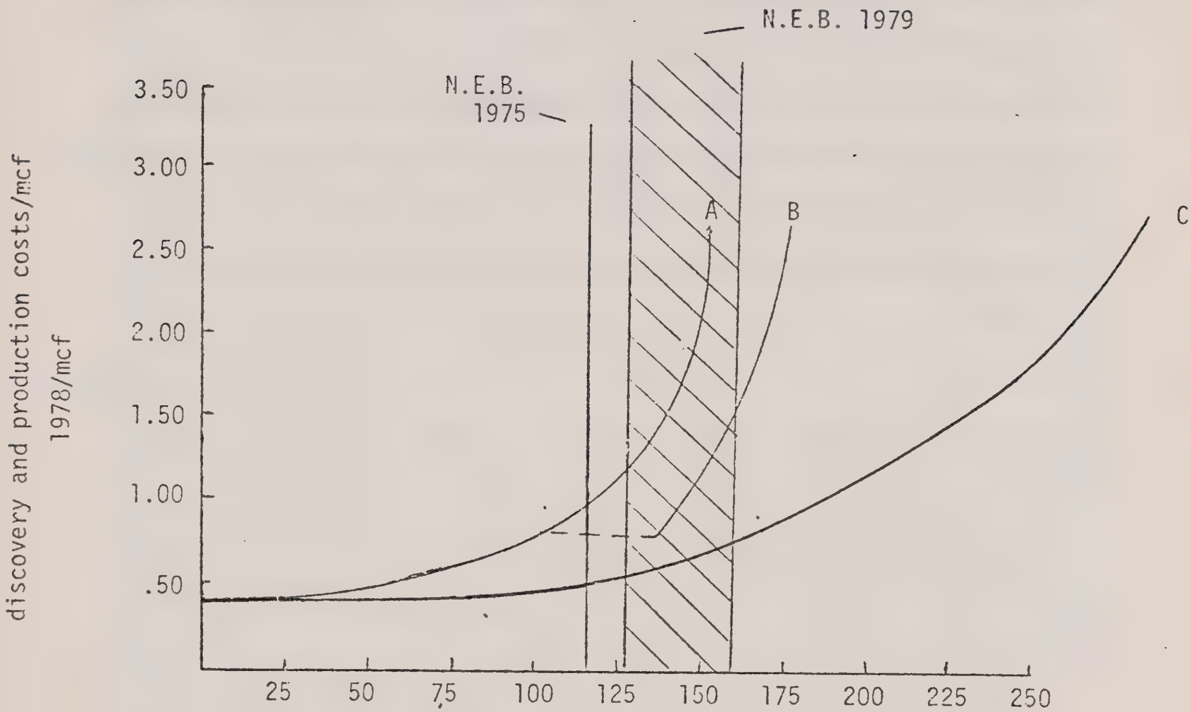

FIGURE 1

other countries) and those that are always available in principle but only brought into use when the wellhead price gets high enough to justify the expense. The relevance of this point is especially great in the present Canadian context, where a large portion of the ultimate reserves indicated by curve C in Figure 1 is dependent on the application of emerging technologies that make it possible, at reasonable cost, to tap gas formations of low porosity. If these technologies are now fully available, and require only implementation, and if curve C or something like it is an accurate representation, then a fairly open export policy would have a low opportunity cost from the viewpoint of future Canadian gas users. If the technology is still nascent, however, the situation becomes more complicated. If the technical progress required is partly of the learning-by-doing type, then the higher costs imposed by early development may be partially offset by the building up of expertise that may itself be saleable elsewhere. If the technical improvements depend on time at the drawing board, and in experimental situations at home and abroad, then the producers and leaseholders may be better off biding their time rather than pushing for fast development of export markets.

What is the evidence to support or discount the type of cost curve shown by curve C in Figure 1? In its support are the impressive drilling results and land price bids that the Deep Basin and other promising areas have generated. On the other hand, the data for drilling effort and results between 1950 and 1975 may be interpreted in a much more pessimistic light. In a recent study of oil and gas finding costs, Russell Uhler (1979) estimated reserve discovery equations where the amount discovered depends on the quantities of exploratory inputs and on linear and quadratic terms containing the cumulated stock of reserves. The effect of his quadratic specification, when applied to total Alberta data, is to give the cost

curve (using reserve discoveries cumulated to 1995) shown in Figure 2. The implied ultimate stock of reserves, at any cost, is well below either the N.E.B. 1979 or the A.E.R.C.B. estimates of the ultimate stock of economically recoverable gas reserves in Alberta, and much farther below the Alberta estimates implied by the Canadian Hunter curve C in Figure 1. Uhler tried including a wellhead price directly in his equation, but found no significant effect during his estimation period, which ended in 1975. Extending his data period would progressively change his results, because the type of reserve additions implied by the Canadian Hunter cost estimates have begun to show up as annual reserve additions of 5 to 6 tcf/year in the late 1970's. Similar potential future additions must also exist in the expectations of those firms now paying record prices in almost every B.C. and Alberta sale of drilling rights. The drilling statistics results are clearly demonstrating some price responsiveness of reserve additions. The key question, from the point of view of export policy, is how long the higher rate of reserve additions will be maintained. Is the shelf of newly-economic reserves being converted quickly to proven reserves, or have we seen only the tip of the iceberg?

Perhaps it would be useful to provide an interpretation of the logic that lies behind the price-elastic cost curve for ultimate reserves. Curve 1 in Figure 3 shows a commonly hypothesized lognormal distribution of pool sizes against frequency. The frequency shows the number of pools of any given size that are worth developing under given technology and prices. The vertical line near the left-hand side of the distribution is a truncation line marking the minimum pool size that it is worth developing under the given technology and prices. It is quite commonly understood that an increase in the wellhead price will cause a leftward shift in the

PRELIMINARY VERSION

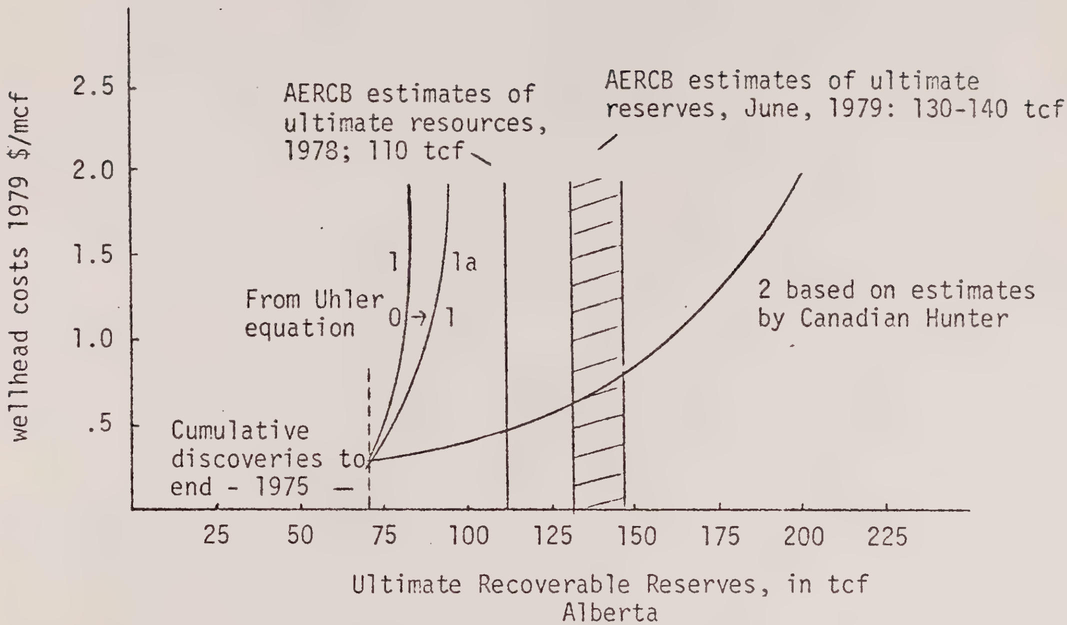

FIGURE 2: Alternative Views of Alberta Gas Reserves Recoverable at Different Costs

Notes: The costs used in the Uhler equation are finding costs, including land costs. To be fully consistent with the notion of economic costs, land costs should be excluded (because they depend principally on the surplus of expected wellhead prices over costs, and not on alternative uses of the land) and production and processing costs should be included. If the former effect should exceed the latter, then Curve 1 should be shifted down, and vice versa. The curve is so steep in any case that Curve 1 is obtained by using Uhler's estimated equation 4.7 to forecast discoveries between 1976 and 1995 under alternative levels (and hence total costs) of exploratory inputs. Curve 1a is obtained by refitting his equation 4.7 to historical data revised to provide some rough accounting for reserve data not

otherwise allocated to discovery wells. A more refined revision of his data is likely to produce a curve partway between Curves 1 and 1a. At a marginal finding cost of $4 per mcf, his estimates of ultimate Alberta recoverable resources are 89 tcf using Curve 1 and 97 tcf using Curve 1a.

PRELIMINARY VERSION

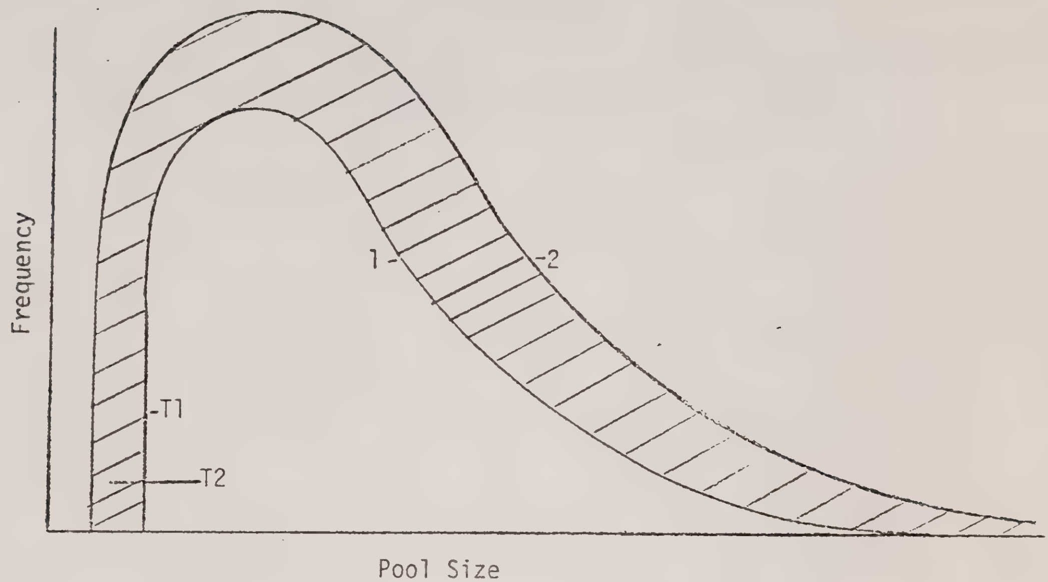

FIGURE 3: Frequency of Economically Recoverable Gas Pools Under Different Price and Cost Conditions.

Notes: T1 marks the smallest pool size that is worth developing at given initial wellhead prices, costs, and technology. When wellhead prices rise, or there are cost-reducing technological improvements, the entire distribution of pool sizes shifts up, as shown by Curve 2, and the truncation line shifts left to include smaller pool sizes. The shaded area shows all the pools that have become potential reserves under the presumed improvement in the relation between wellhead prices and extraction costs.

truncation line as it becomes worth while dealing with smaller pools. However, it is implicit in the optimistic position about future supply that the effects of shifting the truncation line on the given distribution are likely to be much smaller than those following from an upward shift in the whole distribution as there are more pools of all sizes that are worth developing.* Nor is there any reason to suppose that the properly defined distribution of frequency of pool sizes is lognormal either before or after the price-determined shift, as the sources of the additional gas are various - deeper formations, less porous formations, more complicated formations, sour gas, and so on - and each of the incremental sources of gas will have its own distribution of pool sizes that become economic at any given price.

What should be concluded from this survey of the uncertainty surrounding the costs and quantities of future reserve additions of natural gas? First, it is clear that the substantial difference in estimates of ultimate reserves recoverable at various costs reflects not just the difference of viewpoint between would-be conservers and would-be producers for export sale, but also genuine lack of information about the size and number of gas deposits that are likely to be worth developing at the

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* In addition, the size of any given pool, whether or not it is worth developing at all at a given price, is likely to become larger at higher prices. This is because the pool size is in terms of initial marketable reserves, equal to initial reserves in place times a recovery factor. Higher wellhead prices increase the range of economically advantageous recovery techniques, and hence raise the likely recovery rate. This impact is generally much more important for oil than for gas, as gas recovery rates are typically above .7 for gas even at low wellhead prices.

higher wellhead values of this or subsequent decades. Coupled with this is a substantial, although probably lesser, uncertainty about the form and extent of technical progress that could lower the real costs of developing some of the more difficult formations, especially those of low porosity.

Second, the uncertainty about the extent and cost of future reserve additions suggests an export policy that is flexible, has a high reservation price, and is deliberately conservative about future prospects so as to minimize regret and recriminations if history should unfold to match the Uhler equations more closely than the Canadian Hunter supply curve.*

2.5: Analysis of Costs and Benefits

It is possible to do standard analysis of the costs and benefits of incremental exports once one is prepared to adopt specific equations for energy demand, interfuel substitution, costs of incremental exploration and production, the operation of tax and royalty systems, and the behaviour of exploration and development firms. Also important are the assumptions used about the opportunity cost of investment capital, world oil prices, the rate of social time preference, and the possibility of terms-of-trade effects. In the context of the current export decisions, and the current state of available data and equations, the biggest uncertainties exist with respect

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*It is worth noting the link between this issue and the question of taxes and royalties. If the Uhler cost function is the appropriate one, then all the windfall gains can be taxed away without serious impacts on future supply. If the Canadian Hunter curve is closer to the mark, then the tax and royalty system must leave more on the table, at least for new gas, to bring forth the large quantity of potential supplies.

to a) the level and rate of change of future world oil prices, b) the conditional demand schedule of the export markets, i.e., the quantities demanded (in various years) at different reservation prices for exports, c) the marginal value of alternative domestic uses, and d) the cost conditions for new discoveries and production of natural gas and substitute fuels. In addition, there is a tendency for standard models, which do not embody adjustment costs, learning-by-doing, or payoffs to diversification under conditions of uncertainty, to show lumpy export strategies to be preferred, with the size and timing of the lumps dependent on the expected rates of growth of future costs and prices, the tax, royalty and pricing mechanisms used to distribute the costs and benefits, and the discount rates used to compute the present values.

Despite the qualifications, I hope that it will prove possible to use the integrated energy model developed at U.B.C. over the past several years to assess some of the export alternatives. If so, I shall distribute some illustrative quantitative results by the time of the conference. The key value of such results is to show the relative quantitative importance of the various uncertain factors listed above, and hence to help focus future research efforts.

3. Electricity Exports

This section must be smaller than that for natural gas, as space is limited and so is the range of open policy issues. The provinces have tended to operate independently in electricity supply, beyond short-term grid interchanges and the long-term shipment of Churchill Falls Power to Quebec Hydro, and hence to Quebec and United States markets.* Export sales tend to be of two types: short-term interchanges to deal with daily or seasonal shortages and surpluses, and longer-term sales arising when one of the provinces has overbuilt its system and attempts to use export sales to minimize the costs of overbuilding. The issue is a sensitive one, because there is not a single jurisdiction in Canada in which major new power developments do not raise a host of environmental objections. Such environmental issues, whether relating to nuclear power plants, nuclear waste disposal, uranium mining, damage to river valleys, or the side effects of major transmission lines, raise a host of tricky distribution problems. One of the key strengths of the developer's position has usually been the argument that the additional electricity is a key element in assuring that one's neighbours should have lights and that the motors of local industry should be kept turning. At this stage of the planning process, export sales cannot easily be included as port of the purpose of the project, unless the costing of and compensation for environmental degradation were carried much further, and were more widely accepted as a

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* To illustrate how separately the provinces plan their electricity systems, a recent U.S./Canada study (1979) on electricity exchanges notes (p. 23) that for most Canadian provinces the transfer transmission potential with the United States is greater than that with its neighbouring provinces.

solution, than is now the case. For a variety of reasons, many electric utilities have overbuilt their systems in the past decade, despite the project slowdowns caused by environmental concerns and financial stringency. Some have then used export sales and sales-increasing (rather than cost-minimizing) rate structures to cut the gap between peak demands and system capacity.

The main provinces with electricity exports have been Quebec, Ontario, and British Columbia. In the case of Quebec, the main export in the past has been of Churchill Falls power, and in the future is likely to be of James Bay power, which is almost certain to increase Quebec generating capacity faster than demand could grow under almost any pricing policy. In the case of Ontario, the main exports have been of power generated using U.S. coal.* The policy issues that arose in the N.E.B. hearings about the Ontario export had to do with whether Ontario Hydro had made due allowance for the pollution consequences of importing coal and exporting electricity. Export applications of that type are most unlikely to concern long-term exports, given the costs of moving coal and electricity, and the environmental perversity of generating power in one large urban area in order to send it off hundreds of miles to other urban areas.

In British Columbia, exports tend to arise either from unusual water conditions that exceed usuable storage capacity or, as in the past two years, because the system has been overbuilt because of overestimates of demand growth.

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* The extent of the exports is documented in Ontario Hydro (1976), in which the utility spells out its export policy, and its request for permission to increase its permitted exports by a factor of three between 1976 and 1985.

One puzzle is that electricity trade between Canada and the United States, while justified mainly by using system interconnections to share peak loads, has become much more southbound than northbound.

Over the latter half of the 1960's, electricity exchanges between Canada and the United States were more or less in balance, while between 1972 and 1977 annual Canadian exports have ranged between three and eight times the level of imports from the United States, with the level of imports remaining roughly what it was in the preceding years. This pattern of net exports is likely to continue over the next decade, as the winter-peaking Canadian utilities forecast that they will have proportionate winter reserve margins about as large as their U.S. neighbours, while having summer reserve margins roughly twice as large as in the United States.* The Canadian utilities are planning to increase the existing 8,000 megawatts of transmission lines to the United States by adding almost 5,000 megawatts by 1985, an increase of more than 60%.

One interpretation of the increasing southbound flow might be that the Canadian utilities have been more effective in guaranteeing security of supply to their own users, and as a by-product have more often had spare capacity to share with their more restricted U.S. counterparts. Another might be that wasteful overbuilding has been more prevalent in Canada than in the United States. A third possibility, more applicable to the jurisdictions with mainly hydro capacity, is that establishing any given level of supply security in a rainfall-dependent system inevitably requires a higher average degree of underutilized capacity, and hence a higher average capacity to make export sales.

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* See U.S./Canada (1979), p. 14 for the past electricity flows, p. 32a for the projected winter and summer reserve margins between 1978 and 1987, and p.38 for the expansion plans for the international transmission lines.

A fourth possibility is that the prices obtained from the Canadian export sales have been relatively low, thus encouraging the U.S. utilities to draw increasingly on lower-cost Canadian sources rather than their own marginal thermal units, whose fuel costs have been rising rapidly. The recent joint U.S./Canada study group, comprising representatives of U.S. and Canadian utilities, and of regulators in both countries, noted (p. 99): "In regard to the National Energy Board pricing rule which requires that the price of an export be not materially less than that of the least cost alternative in the United States, it should be noted that the Board has always exercised a great deal of discretion in applying this rule and given recognition to the necessity of providing a sufficient financial incentive to the purchaser in the light of any large capital outlays on transmission facilities which may be involved."

The combination of a growing volume of net electricity exports, the plans for substantial increases in international transmission capacity, and an export pricing policy apparently designed to support those investments in transmission lines, suggests to me that electricity exports are likely to raise more policy issues in the 1980's than they have so far done in the 1970's.

A final question, to which I have nothing to contribute, is whether the greater export orientation of the natural gas industry, relative to the electricity industry, is based on differences between the U.S./Canadian cost and demand conditions in the two industries. Alternatively, could it have more to do with the fact that the main leadership and activity in the oil and gas industry has come from U.S.-controlled firms, while electricity supply has been long in the charge of provincially owned firms? At the very least, the fact that the main electrical utilities are provincial Crown corporations in all provinces but Alberta has probably

meant that the N.E.B. has continued to take a more hands-off attitude about the prices and qualities of electricity exports than they have been able to do, at least since 1974, in the case of natural gas exports.

4. Conclusion

In this paper I have dealt at some length with the issues raised by past and possible future exports of natural gas and, to a much lesser extent, of electricity. In the case of natural gas exports, past experiences and current uncertainty about the size and cost of future discoveries both suggest a combination of caution and flexibility in dealing with new export proposals. Thus any commitment to export gas through the pre-built southern portions of the Alaska Highway system should be restricted to the minimum period. This would make it clear that the Canadian gas is not expected to be a long-term substitute for the Alaska gas, and that Canada is able to provide no assurances that the exports will continue if the Alaskan segment should not be built. If the Alaska Highway pipeline is not privately financable on that basis, with or without U.S. government support, then Canadians would be better off without the project, and with a longer and smoother flow of exports making use of marginally expanded existing facilities. Other export approvals should also be on a short-term basis, or could involve some conditional extensions of licences due to expire soon. Any extensions, whether conditional or not, that go more than five or six years into the future involve some loss of planning flexibility against which there is no foreseeable gain. Facilities expansion predicated on export expansion would therefore be kept to a minimum, thus increasing the marginal return on the export sales. A final advantage of the cautious approach to new exports is that it would increase the chance that the permitted volume of exports could in fact be sold at a price high enough to exceed a reservation price based on more valuable future domestic needs or future export sales.

By contrast, the ownership and planning structure of the electricity supply industry is such that there is much less likely to be any major

export-oriented expansion of capacity. Thus the major policy issues relate to the efficiency of their investment, pricing, and distribution decisions, and to the prices of their export sales, and do not involve quite such difficult trade-offs between current export sales and future domestic use.

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ENERGY AND EQUALIZATION

by

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August, 1979

Paper prepared for the Ontario Economic Council's Energy Conference
September 27-28, 1979

I. Introduction*

With the recent resurgence in the upward spiralling of world energy prices Canada now finds itself with a domestic energy price that is more than $10 per barrel below the world level. Moreover, given a world price in terms of Canadian dollars of slightly over $25 per barrel and a reasonable expectation that the world price will escalate in line with general inflation rates, this implies that the typical $2 per barrel per year increase in domestic prices will in all likelihood result in a widening gap between the Canadian and world price for energy. Hence pressures are intensifying for more rapid domestic price increases and the battle lines between the producing and consuming provinces are quickly being drawn.

There are, in principle, three separate issues in this controversy. The first relates to allocative efficiency. At what level should we price domestic energy? Here the edge would seem to go towards moving the Canadian price to world levels, at least for oil. This would curtail demand for energy, increase the supply of oil and gas and in general enhance our ability now and in the future of satisfying domestically our overall energy requirements. The second issue relates to distributional equity and is perhaps the most delicate of all. Who should get the energy rents? A move to world prices would increase energy revenues by some $10 billion (assuming current consumption levels). How much of this should go to the industry, how much to government (and <u>which</u> governments) and how much should be returned to consuming Canadians--these are the energy rent issues. Finally, there is the stabilization issue. What effect will rising energy prices have on income, employment, inflation, regional disparities, etc.?

While separable in principle, these issues in practice tend of necessity to be intricately interwoven and contribute to the inherent complexity of

the current energy debate in Canada. As if this area is not sufficiently intractable of its own accord, there is yet another consideration--equalization payments--that further complicates the policy discussion. The purpose of this paper is to focus on the interaction between equalization payments and energy. Ideally, one would like to be able to take energy policy as a "given" for purposes of evaluating its impact on the system of equalization payments. Reality is different, however. Furthermore, it is also the case that equalization payments have in the recent past had a major influence on energy policy so that the interaction flows in both directions. This being the case, it is not feasible to conduct an analysis of the role and magnitude of equalization payments without on occasion venturing into the domain of the allocative, distributive and stabilization implications of alternative energy policy scenarios. Wherever possible, however, I shall respect the confines of this paper and shy away from commenting on these larger issues.

In order to provide some perspective on the role of equalization payments in the current policy debate it is necessary to present background information both on the operations of the equalization payments system itself and on its interaction with the energy sector over the recent past. This is the focus of sections II and II of the paper. Section IV reviews the changes in the equalization formula that followed in the wake of the quadrupling of energy prices in 1973/74. Attention will be directed to the amendments in 1974 as well as those which were part of the 1977 Fiscal Arrangements Act and, more recently, that were incorporated in Bill C-26. Section V presents an historical perspective on the role that energy royalties have played in generating increases in equalization payments.

With this as background, the analysis turns to the very sensitive issue of whether or not there is an inequity in the manner in which the euqalization program is funded. As part of the analysis, an energy-related "balance sheet" is constructed as it relates to equalization payments. The conclusion of this section is that the energy producing provinces are not bearing their fair share of funding energy-related equalization payments. Section VII applies this balance sheet approach to the impact of a $1 per barrel increase in the price of domestic energy. This portrays, in rather stark relief, the implications of rising domestic energy prices although the analysis tends to focus on the equalization aspects rather than the more-global issue of who ought to receive the massive energy rents.

Section VIII focusses on the implications of the analysis for several issues relating to equalization payments. Principle among these are the appropriate magnitude of equalization payments and the manner in which they are funded. A short conclusion (section IX) completes the paper.

II. Equalization Payments: The Current System

Equalization payments are designed to ensure that all provinces are able to provide "reasonably comparable levels of public services without resorting to unduly high levels of taxation."[1] However, there exists no definition of what might constitute "reasonably comparable levels of public services" nor "unduly high levels of taxation". Indeed, no attempt is even made to define these concepts. Rather, the focus of the program has been on provincial revenues. Specifically, equalization payments were, until recently, designed to ensure that no province had access to less than the all-province average of per capita revenues.

The program currently works as follows. Revenues are equalized over 29 revenue sources (e.g., personal income taxes, corporate income taxes,

sales taxes, six revenue sources relating to oil and gas,...). A list of the 29 revenue categories appears in Table A, appended to this paper. For each of these revenue sources a uniform tax base, representative of provincial taxing practices, is calculated.[2] A province is eligible for an equalization payment (i.e., is a "poor" province, in the equalization jargon) for a given revenue source if its share of the total tax base is less than its share of total population. The value of the equalization payment for a particular revenue source equals this percentage shortfall (normally referred to as the "fiscal deficiency") multiplied by total[3] provincial revenues from this revenue source. A rich province is one whose share of the tax base in question exceeds its population share and its equalization entitlement for this tax source would be negative. An example may be in order. Suppose province A has 5% of Canada's population and province B has 10%. Suppose further that they both have 8% of a particular tax base for which total provincial revenues equal $1 billion. Province A would have a fiscal deficiency of 3% and would have a positive equalization entitlement of $30 million (i.e., 3% of $1 billion) while province B would have a negative equalization entitlement of $20 million for this revenue source.[4]

For each province, these entitlements are summed over the 29 revenue sources and the total, if positive, equals the province's equalization payment. If the aggregated total is negative, the province is classified as a "rich" or a "have" province and its entitlement is set equal to zero. Note that this implies that the system is <u>not</u> an interprovincial revenue-sharing program. Provinces do not contribute money <u>directly</u> toward equalization payments. Rather, payments are financed out of Ottawa's general revenues. The significance of the funding provisions will become apparent later.

Row 1 of Table 1 presents the most recent estimate of the equalization entitlements for fiscal year 1979/80. Only two provinces quality as "rich" or "have" provinces--Alberta and British Columbia, with negative equalization entitlements of roughly \$2 1/2 billion and \$1/2 billion respectively. Hence their equalization payments are set equal to zero; i.e., they do not contribute these negative entitlements toward the financing of the fund. What is probably very surprising to a good many Canadians is that Ontario now qualifies as a have-not province (as it has for the two previous fiscal years) with a positive entitlement of \$172 million. As will be pointed out below, Ontario is not likely to be eligible to receive equalization payments, despite its positive entitlement. Hence the \$172 million is not included in the \$3,007 million total in the last column. Quebec gets just over 1/2 of the total dollar value of equalization payments, although in per capita terms its share is \$241 compared to, say, \$626 for Prince Edward Island. These per capita figures appear as row 2 of Table 1.

Equalization payments are a very significant source of revenue to many provinces. Just how significant is evident from rows 3 and 4 of Table 1. Row 3 presents data on total per capita revenues from all sources (including equalization payments) for the fiscal year ending in March 1979. Row 4 expresses equalization payments as a proportion of these total revenues.[5] For each of the Atlantic provinces equalization payments account for over 25% of total provincial revenues.

The per capita provincial revenues in row 3 are worthy of further scrutiny. Once again, it will come as a surprise to many Canadians to observe that Ontario has the lowest per capita revenues of all the provinces--\$1,646. These revenue figures reflect relative provincial wealth, and relative tax rates as well as transfers of various sorts from Ottawa. To be sure, Ontario's

TABLE I

Energy and Equalization: Selected Data for 1979/80

Row	NFLD	PEI	N.S.	N.B.	QUE	ONT	MAN	SASK	ALTA	B.C.	TOTAL
1) Equalization Entitlements, 1979/80 ($ million)[a]	338	77	410	352	1,522	172	266	41	-2,596	-583	3,007[b]
2) Equalization Entitlements ($ per capita)	589	626	484	502	241	20	258	42	-1,293	-227	-
3) Total Provincial Per Capita Revenues (1978/79)	2,054	2,179	1,739	1,864	2,220	1,646	1,693	2,098	3,303	2,019	-
4) Equalization as % of Total Revenue	29%	29%	28%	27%	11%	0[f]	15%	2%	0	0	-
5) Equalization Entitlements arising from Energy($million)	58	13	86	71	639	860[d]	100	-77	-	-	889[e]
6) Energy entitlements as % of total equalization entitlements (row 5 ÷ row 1)	17%	17%	21%	20%	42%	500%[d]	38%	-187%	-	-	30%

Footnotes to Table 1

a) Source : Provincial Fiscal Equalization Tables: Second Estimate 1979/80 (Ottawa: Department of Finance) July 1979. The final estimates, based on complete data for 1979-80, will not be available until 1981. The equalization entitlements are somewhat larger than those shown in the Department of Finance estimates because the latter incorporates the phasing out of the "sale of crown leases" revenue category under the provisions of the now-defunct Bill C-26. I have treated revenues from crown leases like all other energy revenues, i.e., one-half revenues are eligible for equalization.

b) The $3,007 million total for equalization payments does not include Ontario's $172 million entitlement because, for reasons cited in the text below, it is not likely to receive these monies.

c) Values for total provincial revenues are from Table 1 of Provincial Government Finance: Revenue and Expenditure Estimates: 1978 Statistics Canada Catalogue No. 68-205.

d) Ontario has huge positive entitlements from energy. However, because the remaining revenue categories generate negative entitlements (i.e., overall, Ontario is a rich province for these other categories) its overall entitlement is much less than its energy entitlement, i.e., $172 million from row 1.

e) This total is the sum of the energy entitlements from the seven receiving provinces, i.e., it excludes Alberta, B.C. and Ontario. Note that it does include the negative entitlement for Saskatchewan (i.e., although Saskatchwean is, overall, still a "have not" province for equalization payments, it is "rich" in the energy category).

f) Set equal to zero because of the likelihood that Ontario will not be allowed to receive its equalization entitlement.

per capita revenues would be higher if this province had personal income tax rates as high as some of the other Canadian provinces. By the same token, Alberta's $3,303 per capita underestimates significantly the revenues she would have at national average tax rates. For example, Ontario gets just over $200 per person from sales taxes and Alberta has no sales tax. More interesting, and more relevant for this Conference, Alberta's current per capita revenues from oil and gas exceed the total of Ontario's per capita revenue from all sources. And the potential for these energy revenues to increase dramatically is evident when one considers that the domestic price is over $10 below the world price.

III. Interaction Between Energy and Equalization

The focus of this paper is not on equalization payments, per se, but rather on the interaction between energy prices and equalization payments.[6] With the brief outline of the system as a backdrop we may now proceed to detail the manner in which the energy crisis has affected equalization payments and, as important in some instances, the manner in which the equalization system has constrained overall policy with respect to energy.

Six categories relating to oil and natural gas revenues enter the equalization formula. These are: crown oil revenues, freehold oil revenues, crown gas revenues, freehold gas revenues, revenues from sales of crown leases, and miscellaneous oil and gas revenues. In the latest Finance Department estimate[7] of equalization payments for 1979/80, energy revenues for the producing provinces amount to $4 3/4 billion, of which roughly $4 billion accrues to Alberta. These figures appear as row B.2 of Table 3. In line with the recent revisions to the energy side of the equalization formula (to be dealt with below) half of this amount, or just under $2 1/2 billion is eligible for equalization.

The amounts, by revenue source, of energy monies eligible to enter the formula appear in the appendix table, rows 16 through 21. In comparison to, say, the retail sales tax category (where \$5.6 billion is equalized) or the personal income tax category (where over \$10 billion is eligible for equalization) this is not particularly large (see Table A). Yet the equalization payments resulting from energy are far and away the largest. For example, each dollar increase in provincial income tax revenues generates an average of 7¢ in equalization payments while each corporate income tax dollar results in a 13¢ increase in equalization payments. Compare this with each extra dollar of energy revenue that enters the formula which adds, on average, 40¢ to equalization payments. Data on the amounts that are eligible for equalization by revenue category and the resulting equalization generated also appear in Table A.

Why is this so? Very simply, it results because the energy revenues are concentrated in the three westernmost provinces. Therefore, most of the seven traditional recipient provinces (Saskatchewan is an exception) have a <u>zero tax base</u> for the energy revenue categories. And with a zero tax base, provinces become eligible for their <u>population share</u> of energy revenues eligible for equalization.[8] In effect, then, equalization payments arising from energy essentially amount to a <u>per capita grant</u> for provinces that qualify for equalization. With about \$2.4 billion of energy revenues eligible for equalization and with a population of just under 24 million, the per capita value of this energy grant approximates \$100. Therefore, Quebec, with just over 6.3 million people, gets just over \$630 million in equalization payments from oil.[9]

These provincial energy entitlements appear as column 5 of Table 1. The \$889 million total is the sum of entitlements of the seven traditional

have-not provinces (i.e., all provinces except B.C., Alberta and Ontario). Note that the entitlement for Saskatchewan is negative, implying that for energy this province is classified as "rich". Indeed, as energy prices continue to rise, this province will soon enter the "have" category.

Ontario's position is particularly intriguing. Its energy entitlement is now $860 million. It has been the growth of this entitlement over the recent years as the price of energy has risen that has finally pushed Ontario into the have-not category; i.e., the $860 million positive entitlement for energy is now larger than its overall negative entitlements for the remaining revenue sources so that Ontario now has a $172 net entitlement (row 1).[10]

Row 6 of Table 1 shows the percent of total equalization, by province, that is accounted for by the six energy cateogires. Overall, energy now accounts for 30% of total equalization payments (once again the total excludes Ontario, B.C. and Alberta) although for the Atlantic region the percentages are considerably lower. Later sections of the paper will make further reference to these percentages.

IV. Energy Related Modifications to the Equalization Formula

A. Reaction to the Price Rises in 1973 and 1974

With the advent of the unexpected and massive increase in the price of oil beginning in late 1973, one of Ottawa's first actions was to impose an export tax on oil shipments equal to the difference between the then-fixed domestic price and the rising world price. In effect, Ottawa garnered the entire rent arising from the world-domestic price differential, which amounted to over $6.00 per barrel by mid-1974. No doubt, part of the rationale for this measure was to generate funds for the federal government to subsidize foreign oil imports in eastern Canada, thereby maintaining a uniform price for energy across the country. Unlike the current situation, taxable exports of crude

oil in 1974 exceeded compensatable oil imports so that, on balance, Ottawa was a net financial beneficiary of this action. The producing provinces reacted quickly and increased substantially the royalties they were exacting from both oil and natural gas. Ottawa responded by disallowing the deduction of royalty payments to provincial governments for purposes of corporate income tax calculations. As I have argued elsewhere,[11] one rationale for this Ottawa initiative had to do with the implications for the system of equalization payments. If the domestic price were allowed to rise and the producing provinces allowed to pocket the increased royalties, the result would have been a very substantial rise in equalization payments. If, in addition, royalties paid to the provinces were deductible for corporate income tax purposes, Ottawa might find itself in a situation where its equalization responsibilities would increase substantially but its revenues would not increase commensurately and, in particular, it would not be able to exact much revenue from the very provinces that were becoming wealthy and thereby causing overall equalization payments to increase.

There were, of course, other considerations to be taken into account. Allocative efficiency dictated a rising domestic oil price and in the scramble over who would get the rents, some consideration had to be given to ensuring future energy supplies and this required an incentive for exploration. In the event, a compromise was reached whereby Ottawa maintained the non-deductibility of royalties but introduced (overly?) generous writeoffs for exploration and development and also allowed the domestic price of oil to move gradually toward world price levels. But the equalization dilemma remained. If Canada went to world oil prices in 1974 overall equalization payments would have tripled and in the process Ontario would have become a have-not province. Therefore, in the fall of 1974 Ottawa <u>unilaterally</u> amended the equalization formula. Energy

royalties up to the 1973/74 levels would continue to be eligible for full equalization (i.e., each dollar of energy revenue would continue to enter the formula as had been the case since the 1967 revision). But revenues from energy above the 1973/74 level would be equalized only to the extent of 1/3--one dollar out of every three would be eligible to enter the formula.

This was a major alteration in the formula. For the first time since 1967 the concept of "full equalization" had been abandoned. However, it could be argued that "full equalization" was not abandoned to the degree implied by the 1/3 measure. By continuing to subsidize imports for the eastern provinces (i.e., Quebec and the four Atlantic provinces) in order to maintain a uniform domestic price, Ottawa could be viewed as "equalizing" oil for these provinces, all of whom fall in the have-not category. Some figures on the benefits by provinces of this oil import compensation scheme will be presented later.

B. The 1977 Fiscal Arrangements Act

The next installment in the interaction between energy policy and equalization payments came in the form of further revisions in the equalization program in the context of the 1977 Fiscal Arrangements Act, a major revamping of the financial underpinnings of our federation. These new arrangements ushered in changes in the financing of the conditional grant programs and the revenue guarantee as well as the equalization program. Even for the latter the new provisions extend well beyond those relating to energy, but these need not detain us here.[12]

For our purposes, two provisions are important. First of all, henceforth one-half of all energy royalties would be eligible for equalization. This replaced the previous provision whereby the full amount of 1973/74

revenues were eligible plus 1/3 of any additional revenues. One slight change was that the 1/2 provision applied to all non-renewable resources and not only to energy revenues (i.e., it applied to the six revenue categories for oil and natural gas as well as to the revenues for the "metallic and non-metallic minerals," category 22 in Table A). For fiscal year 1976/77 both the old and new approaches to energy yielded approximately the same amount of revenues entering the formula. But beyond 1976/77 the new provision was far more generous--1/2 rather than 1/3 of additional revenues would be eligible to enter the formula. This approach to equalizing energy revenues was rather surprising since Ottawa's initial position during the negotiations leading up to the new fiscal arrangements was that equalization payments were growing too rapidly. In any event this provision essentially preordained, on the one hand, that equalization payments would continue to rise rapidly as energy prices rose and, on the other, that it would only be a matter of time before Ontario would fall into the category of have-not provinces.

The second provision limited the proportion of total equalization arising from resource revenues of all kinds (renewable as well as non-renewable)[13] to one-third. This essentially put a "cap" on the degree to which equalization payments could be spiralled upward by energy royalties. However, the manner in which this one-third limit was to be applied was unclear. The most straightforward interpretation, and the one that Ottawa probably opted for initially, would be to take the ratio of the resource equalization entitlements for the recipient provinces to the total amount of equalization payments. From Table 1, this is roughly the ratio that appears in the last column of row 6, i.e., 30%.[14] The problem with this measure is that as soon as Ontario qualifies as a have-not province (and it qualified in the initial year of the new arrangements

although this was not recognized until earlier this year when the final estimates for 1977/78 were completed) the ratio increases to somewhere in the neighbourhood of 60%. This is so because once Ontario is eligible to receive one dollar in equalization payments, its energy entitlement of $860 (row 5 of Table 1) is added into the numerator for calculating the ratio. This method of applying the 1/3 limit effectively means that Ontario cannot receive equalization payments. It also implies that the precise 1/3 ratio may never be reached; the ratio may simply fluctuate between say 30% and 60% with percentages in between being unattainable.

At the time of the passage of the Fiscal Arrangements Act, these issues did not appear to be pressing. Finance Minister Macdonald's view was that he did "not expect that the ceiling [would] come into operation except in the most abnormal circumstances."[15] Indeed, the Regulations pursuant to the Fiscal Arrangements Act did not even include a provision relating to the precise manner in which the 1/3 limit would be applied. However, "abnormal circumstances" did come into play, partly because of the tremendous increase in the revenues derived from the "sale of crown leases,"[16] partly because of the overall rise in the domestic price of energy and partly due also to the deterioration of Ontario's tax base for several revenue categories (particularly the corporate income tax base). In any event, scarcely twelve months into the new arrangements it became obvious that Ontario was headed for the have-not category and, therefore, some further modifications were necessary. These were embodied in Bill C-26.

C. Bill C-26

Federal energy-equalization initiatives relating to Bill C-26 (introduced in December of 1978) centered around three issues. The first consisted of elaborating on the manner in which the 1/3 resource limit would apply. Specifically,

Ontario's entitlements from resources would <u>not</u> be included in calculating the resource ceiling, even if Ontario were to achieve the classification of a have-not province. Rather, the resource limit was to be calculated from the seven traditional have-not provinces.[17] What this implies is that the recipient provinces will not be faced with a change in levels of equalization payments because of a change in Ontario's status. For example, suppose Ontario was $1 from becoming a have-not province and it suffered a deterioration in its relative position with respect to corporate income taxes (which, as noted above has been the case over the last few years). This would decrease its negative entitlements from corporate taxes and send it into the have-not category and, therefore, violate the 1/3 limit. In turn, royalties from resources that would enter the formula would then have to be pared back until Ontario was once again in the column of the rich provinces. Overall equalization payments would thus decrease. And vice versa for changes that increased Ontario's negative entitlements from the non-resource revenue sources. Under this provision these sorts of effects are precluded.

Even so, the poor provinces and in particular the Atlantic provinces are not likely to be too excited by this interpretation of the 1/3 resource limit. From Table 1 it is clear that, even without Ontario, the system is currently very close to the 1/3 limit. Yet this is not the case for the Atlantic Provinces (see the last row of Table 1).

Perhaps it is inappropriate to refer to this interpretation of the 1/3 resource limit as an integral part of Bill C-26. It was not incorporated in the Bill itself. Rather it was tacked on as one of the Regulations that was to apply pursuant to Bill-C-26. Presumably the modification could be included as an addition to the series of Regulations pursuant to the Fiscal Arrangements Act of 1977 now that Bill C-26 died on the order paper of the last Parliament.

By itself, this approach to the 1/3 resource ceiling would not prevent Ontario from gaining have-not status and from receiving equalization payments. Indeed, it made such an event possible (compared to an interpretation that would have included Ontario's entitlements in calculating the limit). However, a further provision (incorporated explicitly in Bill C-26) was clearly designed to prevent Ontario from becoming eligible to receive equalization payments: any province whose per capita income is above the national-average level in the current year, as well as in the previous two years, would henceforth be ineligible to receive an equalization payment. Since Ontario falls into this category, it would not be eligible to receive equalization payments, even if its overall entitlements became positive.[18]

The final amendment was designed specifically to reduce equalization transfers to the provinces. In effect it was part of Ottawa's overall restraint program ushered in by Prime Minister Trudeau in his August 1, 1978, address to the nation. Revenue source "sale of crown leases" was to be phased out of the equalization formula. As can be seen from Table A, this revenue source generated \$746 million in revenues (of which \$373 million was eligible to enter the formula) and led to \$147 million in equalization payments. It is true that revenues from sales of crown leases had spiralled dramatically (they yielded only \$100 million in revenues in 1975/76), but this unilateral action by Ottawa only 18 months after the 1977 Fiscal Arrangements Act came into effect demonstrated the increasing arbitrariness associated with federal-provincial financial relations and in particular the continuing influence of energy revenues on the operations of the equalization program. In any event, all of this is rather academic since Bill C-26 died on the order paper with the dissolution of Parliament.

V. Energy and Equalization: An Historical Perspective

Despite these various energy-related amendments of, and modifications to, the equalization program it is nonetheless the case that much of the recent growth in equalization payments has been due to the rise in energy royalties. Table 2 produces some evidence relating to this growth, utilizing fiscal year 1972-73 (i.e., prior to the initial energy price explosion) as the benchmark. Overall payments have increased by just under $2 billion, from $1,016 million in 1972/73 to $3,007 million in 1978/79. In absolute terms the non-energy revenue sources accounted for most of this increase. In percentage terms, however, energy-related equalization payments increased by 517% as compared to 143% for the remainder. In 1972/73, energy sources accounted for 14% of total payments in 1972/73 and this percentage has now risen to 30%.

One way to evaluate the impact on equalization payments of some of the recent modifications is to calculate what equalization would have been in the absence of these provisions. If there were no 1/3 limit on resource revenues and if all resource revenues entered the formula in full (rather than the current 50% level), equalization payments for 1979/80 would amount to $4,964 rather than the present $3,007 million level. At the more detailed level (not presented in the Table) Ontario's <u>positive</u> equalization payment would be $1,032 million while Alberta's <u>negative</u> entitlement would equal $4,389 million. Compared to fiscal year 1972/73 where Ontario's negative entitlements was far in excess of Alberta's ($514 million as against $332 million)[19] this clearly demonstrates the very dramatic impact that energy has already had interprovincial finances. And with the domestic oil price at $13.75 per barrel, Canada is barely 1/2 of the way toward the current world price of over $25 per barrel!

Table 2

Energy and Equalization: An Historical Perspective

Row	Total Equalization Payments ($millions)	Portion Arising from Energy ($millions)	Portion Arising from non-energy Sources ($millions)
Panel A: A Comparison 1972/73 and 1979/80			
1. Fiscal Year 1972/73	1016	144	872
2. Fiscal Year 1978/79	3007	889	2,118
3. Increase			
$	1,991	745	1,246
%	196%	517%	143%
4. Percent Allocation			
1972/73	100%	14%	86%
1979/80	100%	30%	70%
Panel B: 1979/80 Equalization Payments Assuming that there were no modifications to the Equalization Formula[a)]			
5. Level($million)	4,964	3,652[b)]	1,312[b)]
Increase over 1979/80	1,957	2,763[b)]	-806[b)]

a) Adopted from Glen H. Copplestone and Thomas J. Courchene, "Alternative Equalization Programs: Two-Tier Systems" paper prepared for a Canadian Tax Foundation Conference, forthcoming).

b) These numbers may appear surprising. They arise because at "full" equalization Ontario becomes a have-not province while Saskatchewan joins the ranks of the "rich" provinces. For example, from Appendix Table A, the total equalization entitlements currently arising from personal income tax is $768 million. In Panel B, the corresponding (not shown) total is only $229 because Ontario's negative entitlement (it is a rich province for personal income tax) now draws down the level of equalization attributable to this revenue category.

VI. Funding Equalization Payments

The equalization system is a federal program and it is funded from federal revenue sources. Taxpayers in like circumstances contribute the same amount toward the program's funding regardless of their province of residence. It would appear, therefore, that there would be no reason to question the equity aspects of funding equalization payments.

However, I think that it is possible to make a very strong case that the funding of the program leaves a lot to be desired. The potential equity concern arises because Ottawa has undertaken to equalize some revenue sources that are under provincial rather than federal control. For certain taxes, like retail sales taxes, this poses no real problem since I would imagine that the distribution of retail sales across the country does not differ very much from the incidence of Ottawa's indirect tax collections. For other revenue sources concerns do arise because they are so concentrated geographically and yield so much revenue. The combination of these two factors generates large equalization flows. Yet the provinces on the receiving end of these revenues make no direct contribution toward funding the equalization flows that these revenues generate.

A. An Equalization "Balance Sheet"

The case for a potential funding inequity can be put in its extreme form (to be modified later) by referring to Table 3 which presents an equalization "balance sheet" as it applies to energy. As background to the balance sheet proper, Panel A contains a rough and ready estimate of the provincial distribution of Ottawa's general revenue. Population shares, included for comparison only, appear in row A.2. Thus, Ontario, with 36% of Canada's population accounts for roughly 39% of Ottawa's revenue. Alberta's residents account for 12% of total federal revenues while accounting for only 8 1/2% of Canada's population. And

Table 3

Selected Aspects of Funding Equalization: 1979/80

	NFLD.	P.E.I.	N.S.	N.B.	QUE.	ONT.	MAN.	SASK.	ALBERTA	B.C.	Total
Panel A: Federal Revenue and Population Allocations											
A.1 % of Federal Revenue[a)]	1.38	0.28	2.40	1.90	23.60	38.87	3.60	3.37	12.01	12.79	100%
A.2 % of Population	2.43	0.52	3.59	2.97	26.69	36.02	4.36	4.05	8.50	10.88	100%
Panel B: Equalization "Balance Sheet" as it Applies to Energy											
B.1 Production Revenues Accruing to Provinces ($million)[c)]	0	0	0	0	0	1	11	352	4,091	331	4,786
B.2 Equalization Payments Arising from Oil ($ million)	58	13	86	71	639	0[d)]	100	-77	0	0	889
B.3 Province Source of Equalization Payments ($ million)	12	2.5	21	17	209	346	32	30	107	114	889
B.4 "Net Balance"[b)] ($ million)	46	10.5	65	54	430	-345	79	245	3,884	217	
($/capita)	80	85	77	77	68	- 41	77	256	1,935	85	

Note: As pointed out in the text, this table presents a very extreme view of who "pays" for equalization arising from energy. Please consult the text for alternative approaches to viewing the funding issue.

a) These shares were calculated as follows. Ottawa's tax revenues come principally from three sources. Personal income taxes, corporate income taxes and indirect taxes and these mark the simplifying assumption that all of Ottawa's revenues come from these three sources. Next I allocated provincial shares of these taxes according to the tax basis shares (derived from the equalization tables) for personal income taxes, business income taxes and general sales taxes respectively. The provincial shares in row 1 are the result of applying weights (summing to unity and based on the share of federal revenue) and summing the three provincial revenue categories.

b) Row B.1 plus B.2 minus B.3.

c) Adapted from Provincial Fiscal Equalization Tables: Second Estimate, 1979/80, op. cit.

d) Ontario is assumed to be ineligible to receive equalization payments.

so on. Utilization of the percentages in row A.1 to allocate the costs of the program implies that there exist no special federal levies or taxes that are specifically earmarked to pay for the equalization program.

Panel B of Table 3 presents the energy balance sheet. Row B.1 contains the producing provinces' revenues arising from the six oil and natural gas categories (categories 16 through 21 of Table A).[20] Of the $4 3/4 billion total, fully $4 billion, or 80%, accrues to Alberta.[21] Row B.2 shows the equalization flows generated by the revenues in row B.1. These flows are identical to those in row 5 of Table 1, except that Ontario's figure has been set to zero to reflect the fact that in the current Canadian context this province is not likely to be able to receive an equalization entitlement. The $889 million total is then allocated by province in accordance with the percentages that appear in row A.1, and these provincial funding contributions appear as row B.3.

The final rows of Panel B contains the "net balance"--production revenues plus equalization payments minus contributions to funding equalization. Ontario is the only province with a negative figure (-$345 million) while Alberta has a positive total of just under $4 billion. Saskatchewan's position is more intriguing. It gains $352 million from the production side but its equalization payments fall by $77 million and its residents contribute $30 million to financing the program.

Interestingly enough, in dollar terms the province of Quebec ends up with considerably more money than do two of the producing provinces. Quebec's equalization payments from these energy sources amount to $639 million whereas the production revenues from B.C. and Saskatchewan amount to only $331 million and $352 million respectively. This holds true even after the funding of the program is taken into consideration: Quebec's net balance is $430 million

compared with $245 million and $217 million for Saskatchewan and B.C. respectively. In per capita terms, however, this no longer holds. Quebec's net balance is $68 compared to $85 for B.C. and $256 for Saskatchewan. Ontario has a "deficit" of $41 per person compared with $1,935 "surplus" for Alberta. One anomaly still remains: Price Edward Island comes off as well as B.C. in the per-capita net balance.

Even recognizing the questionable nature of this exercise, the conclusion I draw is that there is indeed an inequity in the funding of the equalization program and the producing provinces should be called upon to play a greater role in the funding of the program. More on this later.

B. Problems with the "Balance Sheet" Approach

Elsewhere I have been taken to task for presenting a very similar "balance sheet" exercise.[22] Basically the concern is that it is inappropriate to dissect federal policies in terms of who "gains" and who "loses". My response is simply that I feel that it is appropriate. This is especially so for the energy portion of equalization since Ottawa is involved not only in equalizing somebody else's revenues but as well a set of revenue sources in which it does not reap any returns. But how true is it that Ottawa does not really obtain a share of these energy rents?

What are Ottawa's revenue sources from oil and gas? Among the most important (and some guess at their magnitude) are the following:

1. Excise tax on motor and aviation fuel. This tax is now set at 7 cents per gallon. Last fiscal year (with a tax rate of 10 cents and excluding aviation fuel) it generated about $800 million in revenue with rebates amounting to $300 million for a net gain in the order of $500. This year it should be less, say $400.

2. Manufacturers sales tax: This is currently set at 9%, but for gas and oil it is converted into a specific tax per gallon of gasoline (in the neighborhood of 5 cents). My estimate is about 1/2 billion dollars.

3. Corporate income taxes: Historically Ottawa has garnered about 10% of the total revenue accruing to the oil and gas industry (with the rest split roughly equally between the producing provinces and the industry itself). Presumably most of this is in the form of corporation taxes. Offsetting this is the fact that some of the federal corporate tax is used to pay for equalization arising out of the provincial component . More importantly, via generous exploration, development and depletion provisions, Ottawa has provided substantial funds to corporations which to a very large degree are later captured as royalty rents by the provinces or capitalized in the sale of crown leases, for example.

Overall impact: uncertain.

4. The oil sands levy: Currently set at 50 cents a barrel on all oil products sold in Canada, this tax is earmarked to cover the cost of the difference between the domestic and world prices on oil produced from Syncrude and Great Canadian Oil Sands Ltd., whose output by agreement is sold at the world price level. With a possible daily output of 145,000 barrels a day and a $10 subsidy per barrel, the cost exceeds $500 million. Presumably the oil sands levy is set to break even.

5. Oil export tax: Ottawa, not the producing provinces, receives the revenues from the oil export tax. With the export tax now near $10 and with taxable oil exports in the area of 80 million barrels, Ottawa's revenue from this source is about $800 million. Over time our exports

will taper off as existing contracts run out. Offsetting this is the Oil Import Compensation Program. With increasing domestic oil reaching Montreal, our compensatable imports have fallen to about $140 million barrels or roughly $1.4 billion. Overall, therefore, Ottawa's net <u>cost</u> of these two programs is over 1/2 million dollars.

Even without considering the various federal policies aimed at encouraging energy conservation and the development of alternative energy sources, it appears to be the case the Ottawa does not come out as a major net financial beneficiary so that the earlier conclusion that the producing provinces ought to play a more important role in funding equalization still stands.

But what about the producing provinces? Their argument has been, and presumably will continue to be, that they are already contributing a great deal to the rest of Canada as far as energy goes. Part of their argument is that Ottawa has usurped the revenues from the export tax. In addition, all too often it is forgotten that part and parcel of collecting these resource revenues has been a very significant amount of provincial expenditure (e.g., roads, infrastructure). Most importantly, with official Canadian policy of maintaining domestic prices below world levels, the producing provinces can argue that under existing royalty and tax arrangements they are foregoing massive revenues. In 1979 alone, assuming current consumption levels, foregone provincial revenues would approximate $4 billion.[23] If one believes that Canada ought to go to world prices, this represents a transfer of rents from the producing provinces to Canadian consumers. I have some sympathy with this position, but in my opinion it relates more to who should get the energy rents rather than to the narrower issue of whether or not there exists an inequity in the funding of the equalization program.

Prior to turning to the implication of all of this for the future of equalization payments, it is appropriate to focus on the manner in which equalization payments relate to the pressing current policy issue, namely increasing the price of domestic energy.

VII. The Impact of a $1 per Barrel Increase in the Price of Domestic Oil and Gas

Row 1 of Table 4 shows the effect by province of raising the price of domestic oil by $1 per barrel and the price of natural gas by 14.65 cents per thousand cubic feet (i.e., 85% of the heat-equivalent oil increase). Consumption levels are assumed to remain unchanged as are the current prices of other forms of energy (e.g., hydro power). The total transfer to energy sector[24] is roughly $900 million. Ontario's share is $323.2 million.[25] Row 2 of the Table presents an estimate of the royalties going to the producing provinces. Underlying these figures is the assumption that total revenues will amount to $1 billion. In turn this assumes that Canada's exports of natural gas will also rise in price. Since they are already sold at world prices, the row 2 figures implicitly assume a $1 per barrel equivalent rise in the world price of natural gas. With current royalty arrangements, 42% of total industry revenue will accrue to the producing provinces. The remaining $600 accrues principally to the oil industry with perhaps 10% to Ottawa, although with sufficient exploration expenditure Ottawa's revenues from corporate taxes can fall essentially to zero. These totals are not included in Table 4. Hence the $420.8 million total for producing provinces' revenues (excluding corporate income taxes) in row 2 of Table 4.

Rows 3 and 4 present the equalization entitlements arising from the royalty increase and the allocation of the cost of equalization across provinces

Table 4

Selected Impact of a $1/Barrel Rise in the Price of Energy[a)]

	NFLD.	P.E.I.	N.S.	N.B.	QUE.	ONT.	MAN.	SASK.	ALBERTA	B.C.	TOTAL
1. Cost to Provinces ($ million)[a)]	18.1	3.9	35.9	30.8	199.2	323.2	30.0	40.5	123.1	86.0	890.7
2. Royalties for Producing Provinces ($ million)[b)]						.9	1.5	28.0	361.8	28.6	420.8
3. Resulting Equalization Increase ($ million)	5.1	1.0	7.6	6.3	56.2	0 (75.4)[c)]	8.3	-6.4	0	0	78.1 (153.5)[c)]
4. Funding Allocation for Equalization ($ million)[d)]	1.1	.2	1.9	1.5	18.4	30.2	2.8	2.6	9.4	10.0	78.1
5. "Net Balance" ($ million)[d)]	-14.2	-3.1	-30.2	-26.0	-161.4	-352.3	-23.0	-21.5	+229.3	-67.4	

a) These are based on 1978 consumption levels and are calculated as the sum of the costs of crude oil and its equivalent, natural gas, and LPG's. The crude oil consumption levels by province are taken from the December 1978 issue of Refined Petroleum Products (Statistics Canada, 45-004) Table 3 (utilizing "domestic disappearance"). Natural gas consumption by province is taken from the December 1978 issue of Crude Petroleum and Natural Gas Production (Statistics Canada: 26-006), Table 5, lines 18 through 24. Data for LPG consumption by province (net of that reported from the crude oil and equivalent sources) was estimated from NEB data. The price of natural gas was assumed to increase by 85% of the heat equivalent increase in oil. Specifically $1 per barrel increase in oil was assumed and a 14.65 cent increase (per MCF) in natural gas.

b) Assumes roughly $1 billion in revenues to the oil and gas industry. Royalties are assumed to average 42%, yielding the $420.8 million total. Revenues from corporate income taxes are excluded for this calculation. Gas equivalent price increase assumed to be 15¢ MCF. Adopted from Copplestone and Courchene, op. cit.

c) This would be the increment to Ontario's equalization payments (and, therefore, to total equalization flows) if Ontario were eligible to receive equalization.

d) Assumes Ontario will not receive equalization payments.

e) On the revenue side, this table ignores the flow to the oil and gas industry as well as federal and provincial revenues (especially corporation income taxes) that would ensue.

in accordance with the funding ratios in row A.1 of Table 3. Assuming that Ontario will not be eligible for equalization payments the total equalization flows under current arrangements from a $1 per barrel increase in the price of domestic energy is $78.1 million. If Ontario is included the level of equalization payments essentially doubles--to $153.5 million, as the bracketed figure beneath the last entry in column 3 indicates. On the other hand, once we reach the 1/3 resource cap for equalization payments (and regardless how it is defined, this will be reached well before Canada gets to world prices) equalization payments will not increase as the price of energy rises. The final row in the Table presents the net "balance". Only Alberta comes out on the plus side.

The Table 4 figures put in rather bold relief just what magnitudes are involved in the current energy debate. Moreover, since the current domestic price is roughly $10 below world levels, the impact of moving to world price levels is massive indeed. Even though rising energy prices will curtail demand and will run the equalization program into the 1/3 resource limit, a rough indication of selling domestic energy at world prices can be obtained by multiplying the Table 4 figures by a factor of 10. Seen from this perspective, it is clear that the system of equalization payments is not the critical issue in the policy debate as it relates to energy in 1979. In the 1973/74 era equalization payments played a far greater role because the formula was not only open-ended, but as well energy royalties were equalized in full. Indeed, only after the formula was amended were domestic prices allowed to rise. As noted above, after one or two more dollar-per-barrel increases the program will run into the 1/3 limit and from then on energy prices will not affect equalization payments.[26]

Therefore, even though concern over equalization payments is not likely to dominate the current policy debate, it is nonetheless the case that there are

some important and unresolved (probably "unresolvable" is more appropriate) issues relating to equalization. To these I now turn.

VIII Implications for Equalization Payments

The original, and presumably current, rationale for equalization payments was to ensure that no province had to resort to unduly high levels of taxation in order to provide some "average" level of public services. However, under the 1967 revision of the program, the operational definition effectively became one of bringing all provinces' revenues up to the all-province average.[27]

These two approaches are really quite different. And, in effect, what Ottawa is saying with its recent amendments is something as follows: just because Alberta's revenues are soaring does not mean that it now costs Nova Scotia proportionally more to provide this (undefined) average level of public services. Accordingly, resource revenues are no longer fully equalized. From a progmatic standpoint, however, the modifications were brought about because Ottawa could no longer afford to equalize the rising resource rents, especially since it has been unable to acquire a larger share of these rents.

To my mind this raises two issues. First, what is the appropriate magnitude for equalization payments? Second, how should these payments be funded? I doubt whether either of these questions can have well-defined answers, but I shall attempt to venture some opinions focussing first on the magnitude issue.

At one extreme is the suggestion that equalization payments should be utilized as a means of sharing the energy rents. This might take the form of attempting to reintroduce the concept of bringing all provinces' revenues up to the national average level. Funding considerations aside, I have little sympathy with this approach. Energy rents represent a transfer from

the private sector to the oil and gas industry on the one hand and to governments on the other. In my opinion these rents, if they are to be shared, ought to be returned back to the private sector, especially to those areas of the private sector where adjustment to rising energy prices is most difficult. Transferring funds to provincial governments is not likely to serve this goal.

Now that I have broached the area of rent sharing it is pertinent to recognize that alternative rent sharing arrangements would lead to quite different levels of equalization and not always larger levels. Consider the following scenario. Suppose Alberta chose to distribute the annual inflow of royalties to its residents on, say, a per capita basis rather than simply pocketing them as it presently does. The royalties would then enter personal income of Albertans and would generate income taxes to both Ottawa and Alberta. As a result of Alberta's rising personal income tax revenues equalization payments would increase, but the increase would be nowhere near the levels derived from the current treatment of energy royalties. Moreover, under this approach, Ottawa would obtain far more revenues from energy than it currently does and Alberta far less. Yet the impact of a $1 per barrel increase in domestic oil and gas on consumers would remain unchanged, i.e., the first row of Table 4 would still apply. In other words, equalization flows from energy depend on the manner in which these rents are shared between Ottawa, the producing provinces and the industry. Until rent sharing is settled, equalization as it relates to energy will remain in limbo.

Continuing with this hypothetical example, the principal reason why Alberta would not contemplate distributing its energy royalties to its residents

is that income is taxed differently in the private sector than it is in the public sector. In particular, Ottawa cannot "tax" Alberta's royalties. Nor can it "tax" the growing yearly interest flows that the Heritage Fund is generating. By establishing this fund and utilizing it to reduce present and future taxes in the province, Albertans are in effect obtaining the full (i.e. pre-tax) value of the royalties. It is probably not an under-statement to suggest that the entire policy debate over rent-sharing would be but a tempest in a teapot if income was treated identically for tax purposes whether it accrues to the private sector or to a government.[28] Indeed, such a provision would also remove the incentive that presently exists to nationalize or "provincialize" resource-sector enterprises.

In general, therefore, my answer to the question of how large the flow of equalization payments arising from energy should be is that it depends on the solution to the more important issue, namely who will get the energy rents.

On the second of the two issues, i.e., the funding of current equalization program, I have less difficulty seeing my way to a specific conclusion. Basically, Ottawa should not have undertaken to equalize revenues that are entirely under provincial control. But it did. And the result has led to a serious inequity in funding equalization flows arising from energy. To put it starkly, why should Ontario's residents be called upon to contribute $346 million each year to pay for the equalization that arises because Alberta is pocketing $4 billion annually (from rows B.3 and B.4 of Table 3)? The combined principle of cooperative federalism and the ability to pay suggest that the producing provinces ought to bear a larger portion of the equalization flows arising from energy. Whether this should take the form of a sophisticated two-tier system for equalization payments

where resource revenues would be equalized along the lines of an interprovincial revenue-sharing pool or whether it should take the form of a simple levy on royalties or some other alternative method is a separate issue.[29]

At a more mundane level there are still a few details to sort out with respect to equalization payments. In particular, should Bill C-26 be reintroduced? I do not think so. One of the provisions of this Bill was to reduce equalization payments by phasing out "sales of crown leases" from the formula. This would save Ottawa some money but probably only on a temporary basis, unless Ottawa has in mind preventing the energy producing provinces from garnering any royalty increases arising from rising domestic energy prices. One or two more dollar-per-barrel increases will run the equalization program into the 1/3 resource limit and effectively put a "cap" on energy related flows. Why bother attempting to put a temporary "lid" on equalization flows when the likelihood is that by the time the appropriate legislation would pass Parliament the 1/3 limit (even excluding the crown leases category) would be effective.

The second provision of Bill C-26 represented an attempt to preclude Ontario from receiving an equalization payment. The basis for this exclusion was that Ontario's per capita income is above the Canadian average per capita income. True enough. But equalizing per capita income is not what the equalization program is all about. Rather it has more to do with equalizing per capita provincial revenues. Interestingly enough, at one point during the process of renegotiating equalization payments leading up to the 1977 Fiscal Arrangements Act, Ottawa suggested that personal income per capita ought to be the basis for deciding on the level of equalization payments. However, this

view was rejected in favour of the acceptance of the existing program which, although modified for energy rents, essentially focusses on equalizing provincial per capita revenues. This being the case there is no reason for excluding Ontario from being a beneficiary of the program. With Prince Edward Island receiving $626 per person and Quebec receiving $241 per person, surely no one can take offense to Ontario's receiving $20 per person, as would be the case for 1979/80 (see row 2 of Table 1).

In terms of Bill C-26, this leaves only the question of how the 1/3 resource limit is to be interpreted. My recommendation is that, for each of the receiving provinces, the <u>lesser</u> of its resource entitlements or its equalization payment should enter the numerator of the ratio (the denominator is, of course, total equalization payments). For the seven traditional provinces this would yield the $889 million figure that appears as the last column of row 5 of Table 1 (it would have to be altered by the entitlement from the non-energy resource revenues). For Ontario, the entry would <u>not</u> be its $860 million entitlement but rather its $172 equalization payment (row 5 and row 1 of Table 1). Under this interpretation, the ratio of resource-related payments to total equalization flows for fiscal year 1979/80 would be 34%, which effectively means that the resource limit has <u>already been reached</u>. The approach contemplated by the Bill C-26 approach would imply that the resource ceiling would not be reached until the price of oil increased by at least $1 more per barrel. But since the rationale for excluding Ontario from becoming a recipient province is questionable, I prefer the approach outlined above.

Since the 1/3 limit provision was really a "regulation" to be tacked on to Bill C-26, all that is required is that this interpretation of the resource ceiling be added, belatedly, to the series of regulations pursuant to the 1977 Fiscal Arrangements Act. Put somewhat differently, there is no reason to resurrect Bill C-26.

No doubt the Atlantic provinces will take exception to any of the likely interpretations of the 1/3 resource limit because their resource ratios are currently nowhere near the 33 1/3% level. See row 6 of Table 1. A far more generous interpretation from their vantage point would be to allow energy royalties to enter the formula until <u>each province</u> hits the 1/3 limit. However, such an approach would ignore the very substantial subsidy the Atlantic provinces are receiving from the fact that Ottawa guarantees that the domestic price of oil applies across the country. A rough and ready estimate of the value of the Oil Import Compensation Program, by province, over the next year is[30]: Newfoundland ($179 million), Prince Edward Island ($39 million), Nova Scotia ($355 million), New Brunswick ($306 million) and Quebec ($521 million). Except for Quebec, these figures exceed, by a factor of 3 or 4, the value of equalization payments arising from energy for these provinces (compare them to row 5 of Table 1). Even though it is true that this subsidy will disappear when the Canadian price reaches the world level, it is very difficult for the Atlantic region to claim that they are hard done by current Canadian energy policy.

IX. Conclusion

Equalization payments are an integral part of the glue that binds our nation together. Surely no Canadian would question their existence nor their importance. Nonetheless some important issues have arisen concerning their magnitude and their future role. On the one hand, they are but one weapon in our overall arsenal as it relates to combatting regional disparities. On the other, they have undergone a series of amendments and modifications in the wake of rising domestic and international oil prices, so much so that it is now the case that there exists a good deal of arbitrariness both in the conceptual framework underlying their role and in the manner in which they are being made operational. The thrust of this paper is that this arbitrariness is likely to continue until Canada can sort out the more important issue of how the energy rents ought to be shared among the various competing interests. Equalization payments and, therefore, their role in our federation come up for review in 1982. It is high time that Canadians in all walks of life take time to apprise themselves of the issues and prepare to offer their expertise to these important deliberations.

Footnotes

[*] It is a pleasure to acknowledge the helpful insights and assistance of Glen Copplestone in preparing this paper.

[1] Donald S. Macdonald, "Review and Reform: Fiscal Arrangements into the 1980s," Department of Finance Releast 76-33, Ottawa, April 1, 1976, p. 5. Virtually the same definition of the role of equalization payments was enunciated ten years earlier by the then Finance Minister Mitchell Sharp in connection with the 1967 review of equalization payments.

[2] These tax bases are calculated for each province, whether or not the province utilizes the tax base. For example, Alberta has no sales tax, but its tax base for retail sales is calculated in the same manner as that for other provinces.

[3] The value of total revenues for each revenue source appears as column 1 of the Appendix table. Note that for the six energy revenue sources (numbers 16 through 21) only half of total revenues are eligible for equalization. This exception to the principle of equalizing total revenues will be dealt with below.

[4] For a demonstration that this is essentially equivalent to generating access for each province to revenues equal to the product of average per capita tax rates and average per capita tax bases, see T. J. Courchene and D. A. Beavis, "Federal Provincial Tax Equalization: An Evaluation," <u>The Canadian Journal of Economics</u> (Vol. VI, No. 4 (November 1973), p. 487.

[5] These ratios would be slightly on the high side since we are expressing 1979/80 equalization payments as a percent of 1978/79 total revenues. For example, the figure for Newfoundland would be 27% rather than 29%.

[6]The reader interested in pursuing more on the topic of equalization payments can consult Courchene and Beavis, op. cit., or Thomas J. Courchene, Refinancing the Canadian Federation: A Survey of the 1977 Fiscal Arrangements Act (Montreal: C. D. Howe Research Institute), 1979.

[7]I.e., June of 1979 (see notes to Table 1). The figures that follow in the text do not take account of the July 1, 1979 hike in domestic energy prices.

[8]Recall that, for each revenue category, equalization is a product of the province's fiscal deficiency and total provincial revenues. The fiscal deficiency equals a province's population share minus its tax base share, so that a zero tax base means that its population share is identical to its fiscal deficiency.

[9]Alternatively, Quebec, with a zero oil base and 26.7% of Canada's population, obtains 26.7% of the $2.4 billion of formula-eligible energy revenues, of $639 million. This appears in row 5 of Table 1.

[10]There are other reasons for Ontario's fall into the have-not category. Some of its other revenue sources have undergond serious deterioration relative to the Canadian average. For example, in 1972/73 Ontario's share of the corporate income tax base was 45.24%. By 1979/80 (i.e., for 1979/80 equalization computations) it had fallen to 37.06%, barely above its 36.01% population share. In part, this too is due to energy and the resulting rise of corporate activity in this industry. Comparable figures for Alberta (with a population share of 8.5%) indicate a 9.40% of the base in 1972/73 with an increase to 19.53% in 1979/80.

[11]Thomas J. Courchene, "Equalization Payments and Energy Royalties" in Anthony Scott (ed.), Natural Resource Revenues: A Test of Federalism, British Columbia Institute for Economic Development (Vancouver: U.B.C. Press), 1976, pp. 73-107.

[12]For a survey of these changes, see Courchene, Refinancing the Canadian Federation..., op. cit.

[13]Resource revenues comprise revenue categories 15 through 23 of the Appendix table.

[14]This is somewhat of an underestimate because it does not include the entitlements from renewable resources nor from minerals (i.e., revenue categories 15, 22, and 23, of Appendix Table A). Inclusion of these revenues yields a ratio for 1979/80 of 30.9%.

[15]Donald S. Macdonald, "Fiscal Arrangements and Established Programs Financing," Department of Finance Release 76-108 (Ottawa: Department of Finance), December 1976.

[16]See revenue category 20 in the Appendix table. Prior to 1977 this category yielded little revenue. Indeed, one of the reasons why revenues have soared for this source is that the very generous write-offs for corporate income tax purposes have been capitalized in these sales. In other words, Alberta has captured the rents of Ottawa's generous write-offs. This point is dealt with in greater detail in Doug. Hartle's background paper for this conference "The Federal-Provincial Relations Dimension of the Canadian Energy Issue".

[17]Note that this includes Saskatchewan, a province whose equalization entitlements from resources are <u>negative</u>. Thus even if Saskatchewan were to become a have province it would continue, under this provision, to be included for purposes of calculating the 1/3 limit. This will serve to increase the overall level of equalization payments.

[18]Moreover, since this provision was to apply retroactively to the introduction of the Fiscal Arrangements Act, this means that Ontario would not be eligible for equalization payments in 1977/78 and 1978/79 either, even though it falls in the have-not fold for both of these fiscal years.

[19]From Table 10-2 of <u>The National Finances: 1972-73</u> (Toronto: The Canadian Tax Foundation), 1972.

[20]There are of course other revenues arising from energy, e.g., corporate income taxes derived from oil and gas companies. These are excluded from the Panel B calculations. To be sure, provincial corporate income taxes from the energy industry do generate equalization payments. But Ottawa shares in these tax revenues and more importantly derives the revenues from the very provinces whose increased revenues are causing the rising payments flows.

[21]Since these revenues come from domestic and foreign sales of oil, gas, and exploration rights, a "full" balance sheet would allocate the source of these revenues across provinces. Panel B does not attempt this exercise. However, Table 4 below will provide such a breakdown in connection with the impact of a $1 per barrel rise in the price of domestic oil and gas.

[22]See Thomas J. Courchene "The New Fiscal Arrangements and the Economics of Federalism" and Richard Bird "Report on the Courchene Workshop," in Options: Proceedings of the Conference on the Future of the Canadian Federation (Toronto: University of Toronto), 1977, pp. 311-50.

[23]This estimate is based on the assumption that each dollar per barrel increase in domestic and international energy yields approximately \$1 billion for the energy sector, of which the provincial take is about 40% or \$400 million. Since we are over ten dollars beneath world prices, this yields foregone provincial revenues in the order of \$4 billion.

[24]Note that this transfer is not entirely to the domestic energy sector. For Atlantic oil, for example, the transfer is really to Ottawa since its compensation per barrel falls by \$1, unless the world price rises as well in which case the transfer effectively goes to the exporting nations.

[25]A recent paper issued by Premier Davis of Ontario suggests that the cost to this province of a \$1/barrel increase in domestic oil and gas would be \$310 million. See Honorable William G. Davis, Premier of Ontario, Oil Pricing and Security: A Policy Framework for Canada, August 1979, p. 5.

[26]This is not quite correct. Once the 1/3 resource limit is reached, each \$1 increase in equalization payments arising from non-resource revenues will generate an additional 50¢ in resource-related payments in order to preserve the 1/3 limit. And vice versa.

[27]It should be noted that it was the 1967 revisions that brought oil royalties into the formula. Prior to this, only revenue bases shared jointly by Ottawa and the provinces were eligible for equalization.

[28]This point has been made before in the context of energy rents. See W. P. Gainer and T. L. Powrie "Public Revenue from Canadian Crude Petroleum Production," Canadian Public Policy/Analyse de Politiques, Vol. 1, No. 1 (Winter 1975), p. 10. As Gainer and Powrie point out Section 125 of the BNA Act forbids the taxation of one government's revenues by another government so that implementation of this principle would have to be negotiated through revenue-sharing agreements.

[29]See Copplestone and Courchene, op. cit. for some of the possible alternative approaches to interprovincial sharing.

[30]This assumes that compensatable imports are 140 million barrels and that the average subsidy per barrel is $10. All Atlantic province oil consumption is assumed to be compensated (data are obtained from Statistics Canada publication 45-004) and the remaining imports are assigned to Quebec.

Appendix

Table A

Revenue Categories and Associated Equalizations: 1979/80

	Revenues Eligible for Equalization ($ million)	Equalizations Entitlements for Seven Receiving Provinces ($ million)	Average Equalization per Dollar Equalized[b] (cents)
1. Personal Income Taxes	10,373	768	7
2. Business Income Revenues	2,774	370	13
3. General Sales Taxes	5,620	340	6
4. Tobacco Taxes	715	-3	-.4[c]
5. Gasoline Taxes	1,458	32	2
6. Diesel Fuel Taxes	297	7	2
7. Non-Comm. Vehicle Licenses	595	10	2
8. Commercial Vehicle Licenses	522	35	7
9. Alcohol Revenues: Spirits	899	77	9
10. Alcohol Revenues: Wine	232	9	4
11. Alcohol Revenues: Beer	333	-3	-1
12. Health Insurance Premiums	1,283	39	3
13. Succession/Death Taxes	77	7	9
14. Race Track Revenues	105	16	15
15. Forestry Revenues	325	59	18
16. Crown Oil Revenues[a]	1,144	379	33
17. Freehold Oil Revenues[a]	63	16	25
18. Crown Gas Revenues[a]	737	317	43
19. Freehold Gas Revenues[a]	32	14	44
20. Sales of Crown Leases[a][d]	373	147	39
21. Other Oil and Gas Revenues[a]	46	17	37
22. Mineral Revenues	152	-9	-6
23. Water Power Rentals	55	-11	-20
24. Insurance Premium Taxes	223	2	1
25. Payroll Taxes	505	32	6
26. Property and School Taxes	3,859	208	5
27. Lottery Revenues	212	10	5
28. Miscellaneous Prov. Taxes	1,755	122	7
29. Shared Federal Revenues	16	.2	1
Total	34,780	3,007	9

Source: Provincial Fiscal Equalization Tables: Second Estimate, 1979/80 (Ottawa: Department of Finance) June 29, 1979, Various Tables.

a) Revenues to be equalized represent 50% of total provincial revenues for these sources.

b) Column 2 divided by column 1.

c) A negative entry in columns 2 and 3 implies that on average the seven recipient provinces are "rich" for the revenue category in question. Therefore, the entitlements are negative and serve to decrease overall equalization flows.

d) Under Bill C-26, only 1/4 of revenues for this revenue category would enter the formula in 1979/80. However, 1/2 has been entered, since Bill C-26 did not become law.

THE RECYCLING PROBLEM

by

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A paper prepared for the Energy Conference at the Ontario Economic Council, September 27-28, 1979.

Outline

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III Effects of the Energy Price Rise: (b) Within Canada

IV Recycling and Foreign Ownership and Control

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Preliminary - not to be quoted without permission of the authors; comments welcomed.

I Introduction

"The Recycling Problem" in the context of higher energy prices generated by the OPEC oil price increases seems to mean different things to different people, depending upon their particular position in the economic scheme of things. It is our contention that, within the limited context of Canada alone, the recycling issue is not really one of whether the funds being accumulated, particularly in the much-publicized Alberta Heritage Savings Trust Fund, will end up back in the income stream. Rather it is really a question of painful, inter-regional economic adjustment to a much-changed world and domestic environment. But there is another aspect to the recycling issue which seems to have been given little attention, and that is the fact that much of the oil and gas industry is under foreign ownership and control; in consequence, a large proportion of the funds being channelled to Alberta from the Rest-of-Canada are really being funnelled into the coffers of the foreign-owned multinational oil companies. Also, the high import content of much of the investment needed for Canada to adjust to the changing world environment should be considered briefly in the context of any recycling discussion.

Accordingly, the next section quickly examines the implications for Canadian real income and real GNE of OPEC pricing behaviour. Then, from this beginning, the range of effects and possible adjustment mechanisms to the resulting economic dislocation within the various regions of Canada are briefly surveyed. These reviews set the stage for the third section of the paper in which we examine the implications that foreign ownership and control of much

of the Canadian mineral fuel and manufacturing industries have for Canada and its economic response to the altering world. The final section considers a number of "recycling options" in the light of this discussion.

II Effects of the Energy Price Rise: (a) Canada in the World

Much theoretical and empirical work has been done on the effects of the OPEC oil price rise on the Rest-of-the-World (ROW) and individual countries therein.[1] It is not our intention to go over this ground thoroughly again. Our main focus will be on Canada and what we see as particular Canadian problem areas that, to date, seem to have been given little or no attention. To identify the areas we see as significant, however, it is appropriate to skim quickly some of the main aspects of the broader picture, from a Canadian perspective.

The price effect of the oil price increase has been that the terms of trade of the OPEC countries have improved and so there has been a massive income redistribution from ROW to OPEC. But because Canada has been a net energy exporter,[2] the consequences for it do not appear to have been as serious as for other non-OPEC nations. It is reasonable to believe that there has been, and will continue to be, opportunities for some substitution of other factors for energy in the non-energy sector of the economy (such as the installation of more insulation, improved efficiency of gasoline engines etc.), and that resources have been, and will continue to be mobile to some degree from the non-energy to the energy sectors. Under these assumptions, and excluding for the moment any effects

from changes in the size of savings, it can be shown that, initially, real income will have expanded beyond its original level, although real output may be no larger than it was before the energy price jolt.[3]

The higher real income, however, will tend to increase savings. In addition, internal income redistribution effects may further augment the pool of savings, although this is not certain because the variety of flows taking place is complex. Incomes will expand for producers of energy other than oil and of energy substitutes, and will tend to contract for makers of products complementary to energy, like large automobiles. Again, there will be income redistribution effects brought about by the changed spending patterns resulting from the initial internal income redistribution. Whether total savings are augmented will depend upon whether the income gainers have higher or lower marginal savings propensities than the income losers. A net shift of incomes from real wages to real profits may be expected to raise total savings. A transfer from individuals and corporations not benefitting from the energy price hikes to governments may, or may not, expand savings depending upon which government is benefitting, or at least, upon what the government's policies are. If it uses the extra revenues either for consumption directly or via transfer payments to individuals, or for paying off debt held by the central bank and thus reducing the money supply,[4] total savings could be decreased. If it accumulates a large surplus for investment in the private sector of the economy, savings may be enlarged. We shall return to the influence of governments later in the paper. But for

now, it is perhaps reasonable to suggest that income redistribution effects probably will not prevent, and may contribute to, the higher total savings that may be expected if total real income increases for the economy as a whole.[5] If this is so, then, over time, additional capital formation will be facilitated, and the time path of real GNE may even be higher than it would otherwise have been, or at least no lower than without the dislocation of the OPEC price increases.

Given the framework used so far, it can also be argued that allowing for international capital flows should mean that a net energy exporting country like Canada can expect capital inflows for energy development and hence an even higher growth path for GNE and real income.

But two other considerations should be introduced at this juncture. First, any favourable effects upon Canada will be moderated to the extent that new energy production is much higher cost production, even rising to approximate world prices. That is, with more real resources required to produce a unit of energy than in the past, real income and real GNE cannot be as great as otherwise. Moreover, Canada's position as a net energy exporter would then tend to diminish. The more important this phenomenon becomes, the greater is the likelihood that sustained or rising world prices for energy will eventually adversely affect Canada's real income and real GNE.[6]

Another important consequence for Canada results from the fact that the income and real GNE of most of the non-OPEC world was unfavourably affected by the oil price increases. The magnitude of the impact upon individual countries of ROW has varied with such

influences as the degreee of their self-sufficiency in energy, their competitive ability to appropriate a share of the OPEC import market, and the policies they pursue to achieve internal and external balance.[7] In general two effects have been evident. On the one hand, the higher price of oil has led to higher prices for other energy products, energy substitutes, and commodities using energy as an input to a greater or lesser degree, directly or indirectly, and has caused the general price-level to jump upward. This latter consequence was inevitable unless the prices of other products were to have declined sufficiently. But with money wages inflexible downward, such price declines were unlikely to occur. Hence, the OPEC price hikes have been <u>cost inflationary</u>. But concurrently, the shift of income to OPEC from ROW, and the higher saving propensity of OPEC meant that total savings of the world increased. Although new opportunities for investment were created in ROW, actual investment expenditures have responded only with some lag since it takes time to develop new investment plans, arrange appropriate financing and so forth. Hence the income redistribution has been <u>demand deflationary</u> and unemployment creating.[8] It probably need not have been as severe as it was, for some economies may have overreacted to the cost inflationary aspects of the situation, perhaps because they may have misjudged the kind of inflation they were experiencing. Nevertheless it meant some reduction in overall imports for many of the nations involved, and hence reduced exports for Canada. Our earlier discussion ignored this possibility. When it is taken into account, the net impact upon Canada of the price rises has undoubtedly been less favourable

than initially suggested.[9]

With this broad context in mind, let us examine more closely the situation with respect to the different regions of Canada and the "recycling" problems which may be, or should be, of concern.

III Effects of the Energy Price Rise: (b) Within Canada

The issue receiving common attention is the redistribution of income, primarily to Alberta, from the Rest-of-Canada (ROC). Usually, the focus is upon the size of the Alberta Heritage Savings Trust Fund ($4.7 billions as at March 31, 1979) and its expected growth in the months and years to come, even without any additional increases in the prices of petroleum and natural gas, as the Government of Alberta skims off about 30 percent of the oil and gas revenues it receives for investment purposes.

This is, of course, too narrow a focus. It considers only the financial assets being piled up by the Alberta government in its Heritage Fund. Often ignored is the value of funds being channelled into private hands in Alberta too. The _Alberta Economic Accounts_ provide a rough measure of the total magnitude of the redistribution from ROC to Alberta. For the years 1973-1978 inclusive (Table 1), Alberta accumulated a total surplus of goods and service exports over imports,[10] at market prices, of $17.8 billions. (Prior to 1973, the province consistently had a small deficit each year, amounting to $2.5 billions for the years 1961-1972 inclusive.) Of the gross export revenues from 1973 to 1978, of $54.6 billions, $24 billions or 44 percent were the direct result of higher nominal

TABLE 1

Alberta's Trade In Goods and Services With
The Rest of Canada and The World, 1971-1978

(Billions of Dollars)

	Current Dollars			Constant Dollars		
	Exports (X)	Imports (M)	Balance (X-M)	Exports (X)	Imports (M)	Balance (X-M)
	(1)	(2)	(3)	(4)	(5)	(6)
1971	$ 2.7	$ 2.9	$ -.2	$ 2.7	$ 2.9	$ -.2
1972	3.3	3.4	-.1	3.1	3.2	-.1
1973	4.6	4.0	.6	3.6	3.5	.1
1974	7.8	5.1	2.7	3.5	3.6	-.1
1975	9.0	5.5	3.5	3.4	3.4	.0
1976	9.7	6.5	3.2	3.4	4.0	-.6
1977	11.4	7.3	4.1	3.5	4.2	-.7
1978	12.1	8.4	3.7	3.4	4.3	-.9
1971-78 Cumulative[1]	$60.6	$43.1	$17.5	$26.6	$29.1	$-2.5

Source: Bureau of Statistics, Alberta Treasury, Government of Alberta. Alberta Economic Accounts, 1978 (Sept. 1979), Tables 2 and 3.

Notes: [1]For the years 1961-1972 inclusive, Alberta had a persistent, although small, deficit in its trade accounts, amounting cumulatively to $2.5 billions.

prices for oil and natural gas which resulted in an improvement in Alberta's terms-of-trade. (Table 2). Yet, in a purely financial sense, and if Canada were a closed economy, this could not be considered to constitute a recycling problem. The funds passing to Alberta would have to be put somewhere. If they were left as short-term or long-term deposits in chartered banks or other financial institutions, these institutions would be attempting to lend them out. Or the funds might be used directly by the owners to invest in short-term or long-term securities. Either way, they would be back in the market place. If, as a consequence of the income redistribution, total savings in the economy were augmented, the result would tend to be a decline in the real rate of interest, at least at first--until the new investment opportunities created by the energy price increases were taken up. There would probably have to be some adjustments in the term-structure of interest rates to match up the preferences of the suppliers and demanders of the funds. The intermediation function of the financial community would be an active one. But there would be no financial recycling problem per se. This situation is akin to OPEC vis-a-vis ROW as a whole.

Of course, what becomes clear is that it is probably not the financial recycling problem that most people are really concerned about, but the broader problem of macro-economic adjustment to the terms-of-trade advantage of those areas endowed with relatively large quantities of fossil fuels.

The problems are more serious for some provinces and regions of Canada than for others. In general, the <u>adverse</u> effects

TABLE 2

Alberta's Exports of Petroleum and Natural Gas to the Rest of Canada and the World

(Millions of Dollars)

	PETROLEUM		NATURAL GAS	
	Current Dollars	Constant 1971 Dollars	Current Dollars	Constant 1971 Dollars
	(1)	(2)	(3)	(4)
1971	$ 1,057	$1,057	$ 308	$ 308
1972	1,289	1,271	350	334
1973	1,917	1,547	413	352
1974	4,256	1,451	599	350
1975	4,055	1,198	1,404	356
1976	3,711	1,047	2,197	365
1977	4,303	1,024	2,955	399
1978	4,677	1,014	2,959	373
1971-78 Cumulative	$25,265	$8,609	$11,185	$2,837

Source: Alberta Bureau of Statistics.

upon real income for energy-importing provinces or regions will be lower the closer they are to being zero energy importers; the more substitutable are labour and capital for energy; the more mobile are labour and capital between the energy and non-energy sectors; the more the redistribution of income within the area enhances the savings rate and hence the availability of funds for augmenting investment and subsequent productive capacity and income; the fewer the number of commodities produced in the area that are complementary with oil and natural gas; and the more products produceable competitively within the area that are substitutes for oil and natural gas and also for energy in general, or are exportable to the energy exporting province(s), especially if these products are income elastic--and hence the larger the investment opportunities in the area for internal savings or savings attracted from elsewhere; and finally, the less the degree of downward rigidity in real wages--and thus the less the unemployment that will tend to be created from the initial energy price increases.

It would be difficult to disentangle and assess the net results of these various effects. Perhaps a few broad observations may be made, however. First, although the Maritimes would presently appear to be in the least favourable position with respect to a number of these considerations such as the limited flexibility of much of their labour force, the narrow base of manufacturing activities, and their questionable scope for attracting savings from internal or external sources into new opportunities, the discovery of commercial quantities of petroleum and natural gas in that region (following from the Sable Island gas find, for example), could

quickly reverse any estimates one might make of their comparative position vis-a-vis the other provinces.

Second, one of the main mechanisms of adjustment used among nations disadvantaged to varying extents by the OPEC oil price increases, is not available to the individual provinces in Canada--the exchange rate. And the value of the Canadian dollar which may be appropriate for Alberta may not be appropriate for Ontario or Quebec. Hence a much greater burden is placed upon remaining mechanisms such as diversity in the rates of money wage and real wage increase among provinces, interprovincial labour and capital mobility, labour retraining, and government policies facilitating these alternatives.

If interprovincial and/or inter-regional divergence in real wages is not permitted to occur, perhaps owing to union activity, federal wage scales, or some other such reasons, unemployment will be even greater in the energy poor areas and a greater burden will be thrown on the remaining means of adjustment. Notice, in this regard, that the unemployment frequently will not be easily reduced by standard aggregate demand policies. Much of it will be of a structural nature. To illustrate, plants geared to producing large, gas-guzzling automobiles cannot be kept at full employment simply by the usual monetary-fiscal policies for coping with deficient demand.[11] Structural changes will be necessary. The retraining and geographic relocation of workers to handle new jobs opening up--such as those associated with the construction, operation, and maintenance of heavy oil sands plants will be essential.

The need for real wages to differ among regions becomes even more evident when it is remembered that, on the one hand, labour retraining and geographic mobility is a slow process, and on the other hand, without such differences private capital flows within the nation may well be "perverse" in the sense that they accompany the labour flows to the prospering sections of the country.

These brief remarks suggest that the problems of adjustment within Canada to the world oil price increases are substantial. Most people are probably aware of them, and with varying degrees of reticence, beginning to make such changes as are within their power to make. In the final sections of this paper, we shall make some comments about policies which may assist in minimising the adjustment problems. But first we would like to address another aspect of recycling which relates to the fact that Canada is by no means a closed economy. The existence of substantial foreign ownership and control of the Canadian economy creates additional problems, to which we now turn.

IV Recycling and Foreign Ownership and Control

As oil and gas prices have moved upwards in world markets, attempts have been made by Canadian governments to appropriate for themselves and their residents as much of the economic rents as they could. For example, Alberta has wanted world prices for its oil and gas, though it has been willing to see domestic prices adjusted towards world prices by a series of stages; the net-importing provinces have desired much lower prices, or at least a

greater share in any expanded returns Alberta enjoyed, whereas the federal government has been torn between its desire to control the rate of inflation, and its desire to reduce its oil-price subsidies to Eastern Canada in relationship to the revenues it receives from excise and export taxes as well as the corporate profits tax as applied to the petroleum industry. Royalties were initially increased by the producing provincial governments; provincial royalties were then made non-deductible for federal corporate income tax purposes; subsequently, oil companies were given a "resource allowance", which was equivalent to permitting a sizeable portion (or in some instances, such as on production from non-crown land, more than 100 percent) of the provincial royalties to be deductible from their income in computing federal tax.

Throughout this period, analysis and debate tends to have been concentrated, on the one hand, upon the Alberta government versus the Ottawa and Ontario governments and, on the other hand, upon whether Canadian prices should be raised to world levels. We shall have a few comments to make on these questions later in this paper, where we express the view that domestic prices should be allowed to adjust towards world prices for allocative reasons already well documented by others.[12] For now, however, we would like to focus upon the matter of the large foreign component of the oil and gas industry, which has frequently received comparatively little attention, even though it has, undoubtedly, been lurking in the background of many observers' minds.

The most recently available data on foreign ownership and

control of the mineral fuels industry (which is very much dominated by the petroleum and natural gas sector) is for 1974-76. Depending upon which definitions one uses, the foreign presence accounts for between 78 and 83 percent of both industry sales and profits.[13] These percentages obviously do not take into account the acquisition of controlling interests in Husky Oil by Alberta Gas Trunk Line, or of Pacific Petroleums by Petrocan, but they provide a useful guideline for what follows.

About six years ago, even before much discussion of the division of oil and gas revenues, and ensuing tax changes, had occurred, some rough estimates suggested that, quite apart from any desirable allocative effects a simple raising of the oil price may have upon the efficiency of domestic consumption and production, nevertheless by generating economic rents this price increase involves a net transfer from the pockets of Canadian consumers to foreign shareholders because of the high degree of foreign ownership in the industry.[14] In other words, with existing tax and royalty schemes Canadians would not be able to appropriate for themselves the full benefits that higher prices for their own oil and gas resources might produce. Essentially, there would be a redistribution of income from Canadians to foreign oil companies. Put differently, since nonreplenishable resources are really a form of capital, a transfer of the ownership of this capital from Canadians to foreigners would be involved.

In view of the world energy price increases beyond what anyone dreamed likely six years ago, and the changed royalty, income tax and export situation for Canada, it seems useful to examine once

more the implications for Canadians of raising oil and gas prices. We shall limit ourselves to crude petroleum, for it amply demonstrates the situation, although a similar exercise might be undertaken for natural gas as well.

For simplicity we initially ignore changes in supply, demand, exports or imports that may result from higher oil prices. Let us think of a situation where the world price rises by one dollar a barrel and the domestic wellhead price is also allowed to rise by the same amount. Thus, no change in the export tax is involved. (Suppose, for example, that the domestic price is also being increased by one dollar from $13.75 per barrel.) We shall assume that there are no increases in operating costs such as higher energy costs to pump out the oil--or at least, if there are, they are minimal and can be neglected. Accordingly, the total price rise can be interpreted as revenue to be divided among governments and either domestic or foreign shareholders of the oil producing companies. We also view the retained earnings of foreign oil companies, even though reinvested in Canada, as a cost to Canada as well. Such reinvestment expands their control over the nation's resources and the dollar costs to Canadians of future production and/or price increases of domestic oil as dividend payments and/or capital withdrawals occur.

The foreign share of the bigger revenues will be that remaining after deducting provincial royalties, federal and provincial corporate income taxes, withholding taxes, and the portion of remaining oil industry profits to which Canadians are entitled. But in making these calculations the proportion of

production sold abroad must be taken into account, as the revenues therefrom come entirely from foreigners.[15]

We shall use Alberta royalties, which average about 42 percent on crown lands--from which about 80 percent of Alberta's production is derived--and about 12½ percent on freehold lands--which account for the remaining 20 percent of Alberta's output.[16] The federal corporate tax rate of 36 percent is applied to oil profits after deducting the resource allowance on crown lands of 25 percent of gross revenue from production thereon, less operating costs and capital cost allowances. This allowance in Alberta averaged, for the early part of 1979, about 22 percent of gross revenue.[17] But since we are assuming no increase in operating costs when the price of oil is raised, we shall use 25 percent as our figure for crown lands. On freehold, the oil producers receive a resource allowance for the full 12½ percent royalty they pay the private owner, <u>plus</u> 25 percent on gross revenue after this royalty and other costs are subtracted. Together, these will total about 34 percent of total additional corporate revenues. (Notice, in passing, that producers on non-crown lands get favoured treatment over those on crown lands.) Provincial corporate taxes are 11 percent on profits after deducting royalties paid either the provincial government or freehold owners.

Federal withholding taxes on dividends to countries with which Canada has a tax treaty, such as the United States, are 15 percent, although if a company has at least 25 percent of its shares held in Canada, it can qualify for a 10 percent withholding tax rate on payments abroad.[18] We shall use 15 percent, so clearly our

estimates of this tax are a maximum. For the extent of Canadian ownership of profits after royalties and corporate income taxes, we use the 82 percent figure.[19]

Canadian exports from domestic production of crude oil to the United States for the first six months of 1979 averaged about 10.2 percent of total output. We also allowed for exports of Canadian crude in the form of refined products, amounting to about another 2.6 percent of domestic output, so that total exports were taken to be about 12.8 percent.[20]

Utilizing these various percentages in the model, we find that the foreign share of a one dollar per barrel increase in oil prices, in the world and Canada simultaneously, is about 21 cents per barrel. If there were no exports, this would be the average loss of funds by Canadians, per barrel of oil produced, from each dollar increment in the price as we pay foreign investors more money for the privilege of consuming our own resources. Once allowance is made for existing oil exports to the United States, for which the full payment comes from U.S. residents, the <u>average</u> loss per barrel of oil produced for each dollar price increase is reduced to 8.5 cents.[21] At 1979 rates of production of about 1.8 million barrels daily or 650 million barrels a year, this modest figure amounts to about \$55 million each year. If we were talking of simultaneous price increases in Canada and the world of \$10 per barrel, the annual numbers are more impressive--\$550 million. And if a remaining 10 year life on existing conventional oil reserves of about 6.5 billion barrels were assumed, the losses would be in the billions of dollars. These losses would not, of course, be simply ten times the

foregoing number, since an allowance must be made for rising recovery costs as existing reserve pools become depleted. We return to this question below.

Given the existing level of exports and the structure of resource taxation, Canadian ownership of the oil industry would have to be about 50 percent in order for the nation to avoid a net transfer to foreigners of the additional economic rents resulting from any oil price increase in which the industry itself receives the higher price at the wellhead. But if, over time, Canadian oil exports are reduced below the present level of approximately 13 percent of production, then Canadian ownership would, in turn, have to be increased even more, for Canada just to break even. Given the structure of resource taxation, if exports were zero, 100 percent ownership of the industry would be required to prevent any economic rents going to foreign firms.

To this juncture, we have assumed that Canadian and world prices were raised together so that we did not have to consider changes in the export tax. If, however, the domestic wellhead price of oil were allowed to increase by one dollar a barrel, coupled with a one dollar decrease in the export tax, then, from the viewpoint of Canada as a whole, there would be a redistribution of income from Canadians to the foreign-owners of the oil industry equal to over 21 cents per barrel on all Canadian production either consumed domestically or exported. The annual cost of this policy would be \$138 million. If the domestic wellhead price were permitted to rise to <u>world</u> levels (about \$15.25 above the existing price at the time of writing), and the export tax by the federal government were

simultaneously removed, the cost to Canadians would be $2.11 billions annually.[22]

Notice, however, we are <u>not</u> arguing, at this point against raising domestic crude oil prices to world levels. Indeed, it is our view that a gradual adjustment towards world prices is essential. In ignoring the allocative benefits and concentrating on the distributional costs, we are merely suggesting that because of the high proportion of foreign ownership of the oil and gas industry in this country there is a potentially large cost to Canadians as a whole if price increases are allowed which do not take the foreign ownership factor into account when the method of increase is devised. Clearly, some revision of the existing structure of royalty rates and resource taxation is required, at least for existing production levels coming from known conventional oil fields (or old oil), as world prices for oil are phased in and the current export tax is removed. The simplest way of doing this would be for the federal government to replace the current export tax with an excise tax on <u>all</u> domestic production of conventional crude. But this simple arrangement is clearly unacceptable to the producing provinces.

We view this actual or potential shifting of funds from domestic ownership to foreign ownership as at least as substantial a problem as the types of East-West confrontation within Canada that have commanded so much attention. As we shall indicate in the final section of this paper, this perspective provides a number of insights for assessing present and future Canadian policies related to the energy problem. But first, several possible arguments against our position should be mentioned and addressed.

One of these is that it is "exceedingly mercantilistic... to desire policies which benefit Canadians at the expense of others...".[23] The term "mercantilistic" used to have a fairly precise, and useful, meaning but more and more seems to have become one which economists use to dismiss arbitrarily anything in international trade policy discussions which they do not like, without necessarily having thought the matter through carefully. One does not need to be a mercantilist to make a good case for policies benefitting Canadians as a group at the expense of foreign-owned oil companies. Very simple welfare analysis suggests that it is the proper thing to do <u>from the viewpoint of world welfare</u>. If one accepts the idea of diminishing marginal utility of income, and/or that it is desirable from a welfare point of view that income should be redistributed from those with higher incomes to those with lower incomes,[24] the case is made. To the extent that the foreign oil companies are owned in the United States, then, since on average, Americans and, more particularly, the owners of oil companies have higher incomes than Canadians, world welfare is improved by redistributing income in favour of Canadians. Even if the oil companies are not owned by Americans, to the extent that they are owned by foreigners in the income groups with higher earnings than average Canadian earnings, <u>world</u> welfare will be enhanced by redistributing income to Canadians in general. We should thus be cautious about branding any wish to protect Canadian interests with the pejorative term "mercantilistic".

Another view is that this simple type of analysis cannot shed much light on Canadian versus foreign income gains because the

matter is more complicated than allowed for by our model. Foreigners own manufacturing and other companies in Canada as well, and export some of their produce. Canadian-owned firms facing changing oil prices also export part of their output. Surely these matters must be taken into account more precisely for any calculations to be meaningful--or so the argument goes.[25]

To allow for these possibilities, however, does not alter our conclusion that the high degree of foreign ownership of the oil industry warrants the development of policies which do not permit a net loss to Canadians in general from raising the price of their own resources. Consider foreign ownership of domestic manufacturing firms selling both to Canadians and abroad. Suppose the internal price of oil is allowed to rise to world levels, but concomitantly, foreign oil companies are prevented from obtaining the benefit of the economic rents on existing production which such a policy might allow, so that there is no net loss to Canadians from this source. Suppose also that prior to the increase, in line with the current situation, Canadian oil prices were below those abroad,[26] so that the foreign producer in Canada had the possibility of gaining some economic rent, or a return above that necessary to keep him in business in Canada. He might obtain this because he was able to sell to Canadians at a price approaching that charged by producers from foreign lands whose costs of energy were higher (assuming competition within Canada did not compete all such extra returns away). Or he might be exporting and getting world prices for his output. Either way, the raising of domestic oil prices to world levels would <u>remove</u> this scope for such foreign-owned processing or

other non-energy-producing firms in Canada to gain above the required rate of return to keep them in operation and would involve some additional redistribution of income from foreigners to Canadians in the process.

Canadian-owned firms exporting part of their output would also lose extra profits on sales abroad as domestic energy prices rose to world levels. Since the firms would have been selling at approximately world prices anyway, even before the domestic energy price increase, this would not be a situation of Canadians losing and foreigners gaining. Rather it would represent an income redistribution within Canada.[27] Thus, the introduction of non-energy producing firms does not in any way invalidate our conclusion that oil price increases should not be permitted to be an occasion for a transfer of funds from Canadians to foreign-owned oil companies.

A third argument is that if foreign-owned oil companies are not permitted to extract the full benefits of the price increases, one of the main reasons for letting energy prices rise towards world levels will be lost, namely, the development of additional supplies will not be stimulated sufficiently.[28] Whatever may be the case for the development of new more expensive sources of petroleum energy, it is not true that prices on present reserves need to be raised to generate appropriate incentives. To do so would only add to the economic rents the oil companies are already obtaining at the $13.75 price.

That there are economic rents at this price, and that the oil companies are obtaining a share of them seem both to be

reasonable conclusions. Nearly all of existing conventional petroleum reserves (at least 96 percent) were discovered prior to 1973, at which time oil companies were found to be making a comfortable rate of return of greater than 15 percent, even though the average 1972 crude oil price was only $2.77 per barrel.[29] Granted, operating costs have risen about $1.07 per barrel since then (from $.43 in 1972 to $1.50 in 1978), but that still is not nearly enough of a change to alter the fact that there are enormous economic rents to be obtained from current production of existing reserves. It is clear, therefore, that there is no sound economic reason why oil companies should be permitted to reap the gains from still higher oil prices on the great majority of current proven reserves. In fact, if one uses the 1972 price of $2.77 and adds on $1.07 per barrel for increased operating costs, one could argue that even at today's price of $13.75, large economic rents are being drained off by the foreign multinational oil companies. Given the royalty-tax structure outlined previously, these would amount to about 82 cents per barrel, or, at current annual rates of production, about $535 million per year. For a nation that claims to need massive capital inflows all the time, and is increasingly going into debt internationally, this seems to be an unnecessary "recycling" of Canadian wealth to foreign investors.

To return to the main issue under discussion, namely, still higher oil prices to stimulate additional new exploratory drilling and development, and secondary recovery techniques (and therefore to maintain full employment of drilling rigs and crews as well) two or three comments are necessary. First, has the

arithmetic been done to indicate that a wellhead price per barrel <u>greater</u> than $13.75 is necessary to accomplish these objectives? Or, would higher prices on new conventional production simply provide new economic rents? Is perhaps the real constraint the skilled manpower required rather than an inadequate return? We might note that even without the most recent oil price increase, there has been quite a phenomenal expansion in drilling activity in recent years--from 5597 wells in 1975 to 10,043 wells in 1978, and the shortage of experienced workers just in this part of the operation alone has been a problem. Note also, that exploration and drilling incentives such as extra tax rebates for new expenditures, or subsidies for new wells are a way of increasing the rate-of-return on investment and have the advantage that the funds provided would have to be used in Canada, in the oil industry, for expanding Canadian capacity, and could not be diverted for use in other industries or other countries.

In brief, this section of our paper suggests that more attention needs to be given to the significance of the large foreign presence in the Canadian oil and gas industry when considering energy policy. We have focused only on the distribution of the gains from energy price increases with respect to foreign-owned firms. We might also have noted that any economic rents which they are able to appropriate are not the only possible source of loss to Canada. For example, as a number of studies have shown,[30] foreign-owned firms generally import a larger proportion of their purchased inputs than do domestically-owned firms, thus reducing the potential market for Canadian producers of machinery, equipment and component parts, and

causing greater leakages from the Canadian income stream than might otherwise be necessary.

V Implications for Recycling Strategies

The foregoing discussion suggests that foreign ownership and control of nonreplenishable resources is not an irrelevant issue when considering methods of raising energy prices. The export tax route that Canada has been following is certainly a means to prevent a portion of the economic rents from going to foreign-owned oil companies. An excise tax on domestic consumption is a means to do the same inside the country, while simultaneously forcing consumers to reallocate their spending to reflect the world's valuation of energy costs. Drilling and other exploration or secondary recovery incentives can be used to encourage additional supplies of conventional crude production.

These possibilities, however, ignore two other issues of importance in this context: (1) which level of government should receive the economic rents, and (2) how should the funds be spent?[31] These are really aspects of the broad macroeconomic adjustment issues outlined in the second and third sections of this paper. Hence, in what follows, we draw on these sections and various well-known characteristics of the Canadian economy. We shall not attempt to discuss these questions in full, for they fall to a large degree squarely in the domain of other papers at this conference. But a few comments can be made.

First, given the enormous projected needs for investment in the energy producing sector in the years ahead,--not to mention

the other huge anticipated investment needs in sectors such as transportation--any decision about which level of government should receive the economic rents from Canadian oil (and gas) resources should be made, in part, according to which government is most likely to use the funds for productive capital formation rather than current consumption. Or to put the matter another way, the distribution of revenues should be made only with a national agreement and understanding that a certain (large) proportion must be employed for capital formation in the energy sector. It is really not so important which government receives the funds as it is that measures are taken to increase the rate of national savings, and that these savings are employed, not foolishly and wastefully, such as to build new office buildings for civil servants in Hull when there are already adequate buildings in Ottawa, but for purposes which will yield an adequate rate of return in the future. If such revenues are used simply to reduce taxes or provide unemployment insurance benefits or other transfer payments, national savings are not increased. The only rise in savings will be that resulting from the general desire of people to replenish their cash balances in the face of inflation (should the money supply not be increasing rapidly enough for them to do this otherwise). That is to say, our earlier observation in Section II that savings may increase in the energy exporting area may not come about if it is governments who extract the rents and if these governments have as high, or higher, propensities to consume than do the individuals who consume the energy at higher prices. Thus, foreign ownership is not the only issue. Government vision and responsibility are

important too.

These remarks are also useful with respect to the use of the Alberta Heritage Savings Trust Fund. The first question is, given the vast needs for energy investment in this country, is a Heritage Fund that accumulates only 30 percent of the revenues, that is, 30 percent of the value of resource assets sold off, sufficient, or should the percentage be even higher? We take the view that it is essential for the whole of Canada that someone undertake the required saving for the days when our non-renewable resource stocks are depleted; the fact that a provincial government is undertaking at least part of this saving may at least guarantee that it actually occurs. However, it is our view that a larger percentage of the value of resource assets sold off by the Alberta government should be placed in the Heritage Fund each year.[32]

Second, what is the optimal use of the Fund's resources in the light of the foregoing observations? Lending to other provinces or even the federal government for them to meet their consumption needs is certainly not optimal. There is no guarantee whatsoever that investment in the country will be expanded by this route. Albertans may have the interest payments coming in in the future, but no net wealth will have been created for Canada and Canadians in general. Lending for direct physical investments in other provinces such as the Prince Rupert grain terminal is clearly another matter, however.

Third, the problems which foreign ownership create suggest that Alberta would be well advised to invest in the energy sector

directly, or indirectly through a government and taxpayer-owned corporation. This investment should be in the form of equity, not debt, so that the gains from additional world energy price increases will accrue to this corporation rather than to foreign investors. There is, essentially, no investment where the market risk of insufficient future sales could be less than in energy today. (The risk of loss of real capital value in such investments is probably much less than the potential loss in lending to other provincial governments at ten percent interest rates.)

Not incidentally, Alberta would probably be better off investing in oil sands plants, which actually involve refining as well, and in that sense are manufacturing, than attempting to invest or promote investment in industry in Alberta for which the local market is insufficient in size for sufficient economies of scale to be achieved to compete effectively with imports from production elsewhere in Canada or abroad. It is true that there are many more industries for which production to serve the needs of two million people, especially when they are isolated to some degree by transportation costs, can be competitive than was once thought. But still, given the vast needs for energy production in Canada in the future, and the knowledge that much of this energy production will have to come from Alberta, whether it is conventional oil and gas, heavy oil, oil sands, or coal, it may not be a sensible policy for Alberta to overheat the economy even more than now by attempting to stimulate a lot of other types of manufacturing, even if these could be competitive. Just the continuing investment in housing, and the wide range of supporting social overhead capital or

infrastructure, plus the warehousing and merchandising and service industries that an increased population demands, will mean that investment and employment in Alberta for growing numbers of people will continue well into the foreseeable future.

Note too that perhaps other provinces like Ontario might view more favourably the retention of oil revenues by Alberta if Alberta showed more interest in increasing its purchases from the rest of Canada, not in decreasing them in favour of local production. This is one of the major ways that the Canadian macro-economic adjustment problem would be simplified.

This leads to another point relating to the propensity of foreign-owned firms to purchase more of their needs abroad than do domestically-owned firms. Since it is well known that Canada is going to have to have many more oil sands plants in the future, it would seem reasonable that Canadian firms should negotiate with foreign bidders on the huge amounts of machinery and equipment which Canada has to import (imports equal 75% of domestic consumption--although Canada also exports some specialized machinery and equipment too) to obtain a license to produce them in Canada. Where the technology of manufacture is well-known or not difficult new firms could be set up in Canada to supply domestic needs. This new production could be located in provinces such as Ontario and Quebec where there already is a pool of skilled labour, or at least additional people could be trained most readily with the aid of the existing workers and firms. This, of course, would, on occasion, require negotiations at the national level, playing, where necessary one foreign supplier off against another--just as the Japanese do,

and developing countries do, and as Canada faces when attempting to supply Candu reactors to other nations. Government participation in all subsequent oil sands plants via major equity interests would be one way of being intimately involved in this process. Oil sands technology is highly specialized and Canada is going to be involved in it for years to come. There are good reasons that we should have the capacity to supply much of the basic machinery and equipment needs in this country.

The standard argument against such a policy is that we may not have a comparative advantage in this area--that to follow a policy such as we are suggesting is a beggar-thy-neighbour attempt to create employment domestically at the expense of employment abroad. But those who downgrade this possibility generally argue that monetary and fiscal policy can be used to create domestic employment. More and more, with high unemployment rates persisting, it is evident that this is not as easy as it is made out to be. If the additional employment is created in the production of non-tradeable goods and services, or instead consumption demand is sustained simply by transfer payments like unemployment insurance, Canada will not be generating the capacity to replace imports or increase exports. This seems to be the situation at present, with many manufacturing industries running close to capacity even though unemployment remains high, so that a further depreciation of the dollar will not readily produce an improved merchandise account balance.

It is easy to argue that Canada's comparative advantage is in crude resource production and that this is where we should

concentrate our efforts. But the employment creating effects of additional resource production and export are less than the employment destroying effects of reduced manufactured goods output. In fact relying excessively on non-replenishable resource exports, particularly if the rents go abroad, may be a long-run beggar-thyself policy. (Note, however, that this conclusion can be applied equally well at the provincial level.) In addition, when there is one or only a few large suppliers abroad, competition may be improved by fostering production with a domestically-owned and controlled plant.[33]

Finally, note that another alternative towards which Alberta's Heritage Fund might be utilized is to purchase controlling interests in those foreign-owned oil companies having major operations in this country. Imperial Oil, which is 70 percent owned by Exxon Corporation, would be a good example. Although it reduces the immediate supply of funds available for investment in more Canadian energy production, this kind of step would have several longer-term favourable effects. It would make the wider resources of the companies purchased available for increasing subsequent Canadian energy production, without expanding future interest and dividend outflows or foreign control of the economy. It might perhaps provide additional technical expertise, although most of such expertise is already available to Canada. It would also make it easier to provide increased opportunities for Canadian suppliers of machinery and equipment in the future. Since foreign capital is probably still going to be needed for energy investment for at least some years to come, it would be better to borrow debt capital abroad while maintaining and increasing equity holdings at home.

Footnotes

1. E.g. W. M. Corden, Inflation, Exchange Rates and the World Economy (Chicago: University of Chicago Press, 1977); Edward R. Fried and Charles L. Schultz (eds.) Higher Oil Prices and the World Economy: The Adjustment Problem (Washington: The Brookings Institution, 1975); Helmut A. Merklein and W. Carey Hardy, Energy Economics (Houston: Gulf Publishing, 1977); T. M. Rybczynski (ed.) The Economics of the Oil Crisis (London: Trade Policy Research Centre, 1976); Haim Ben-Shahar, Oil: Prices and Capital (Lexington: Lexington Books, 1976).

2. T. L. Powrie, Energy Policy and the Balance of Payments: An Outline of the Issues (Calgary: Canadian Energy Research Institute, 1979). Of course, Canada now is a significant net importer of crude petroleum.

3. Department of Finance, Government of Canada. The Effects of Higher Energy Prices on Long-Run Growth (Ottawa: November, 1978).

4. John Williamson, "The International Financial System", in Fried and Schultze, Higher Oil Prices ..., p. 209.

5. At least the Department of Finance seems to think so. See The Effects ... .

6. Ibid., pp. 23-24.

7. See Corden, Inflation, Exchange Rates ..., and Fried and Schultze, Higher Oil Prices ... .

8. Corden, ch. 7.

9. For an initial look at these effects, see G. V. Jump and T. A. Wilson, "Macro-economic Effects of the Energy Crisis 1974-1975", Canadian Public Policy, I (Winter, 1975), pp. 30-38.

10. Not all business service payments are picked up in imports, so they must, therefore, appear in the overall residual. For 1975-78 the residual is fairly large (1975 = -$413 millions; 1976 = -$849 millions; 1977 = -$498 millions; and 1978 = millions. We develop the foreign ownership issue below.

11. Jan Tumlir in "Oil Payments and Oil Debt and the Problem of Adjustment" in T. M. Rybczynski, The Economics of the Oil Crisis, pp. 54-61 has some interesting discussion on the structural or frictional unemployment caused by the dramatic changes from oil prices.

12. See, for example, W. R. Thirsk and R. A. Wright, "The Impact of the Crude Oil Subsidy on Economic Efficiency in Canada", Canadian Public Policy, Vol. III, Summer 1977, pp. 355-364.

13. For 1976, Calura estimates of the shares that foreign-controlled firms enjoyed of the total mineral fuels industry sales and profits were 83 percent and 81 percent, respectively. Statistics Canada, Corporations and Labour Unions Returns Act: Part I (Ottawa: 1979), pp. 152 and 156.

    In Calura reports, a firm is classified as foreign-controlled when at least 50 percent of the voting shares are held by foreigners. But in practice a large proportion of the foreign firms hold 95 to 100 percent of the shares. Again, many firms not classified as foreign-controlled have up to 49 percent of the shares held by foreign interests. For 1974, the last year in which Calura reports showed the proportion of profits, sales and so on that were attributable to individual categories of foreign ownership (0-4.9%, 5-24.9%, 25-49.9%, 50-74.9%, 75-94.9% and 95-100%) one can calculate that foreign ownership was accountable for at least 78 percent of industry profits and 80 percent of sales.

    Some integrated oil producing firms are actually included in the manufacturing statistics for petroleum and coal products. The 1976 Calura report indicates that foreign controlled firms were responsible for 100 percent of profits in that year. If we use the 1974 Calura report showing separate degrees of foreign ownership, the shares of sales and profits attributable to them were 79 and 78 percent, respectively. Thus, classification problems between the crude production and the processing sectors should not greatly distort the numbers used.

14. F. Roseman and B. Wilkinson, "Who Benefits? The Alberta Energy Price Increases", Canadian Forum (June-July, 1973), pp. 48-52.

15. The model is as follows:

    (1) Canadian-owned revenue from \$1 increase in the oil price

    a) Royalties: $r_g(1-f) + r_f.f$

    b) Corporate income tax: $\pi_o[(1-a_g)(1-f) + (1-a_f)f]$

    $$+ \pi_a[(1-r_g)(1-f) + (1-r_f)f]$$

c) Withholding tax: $w(1-p)[1-r_g(1-f) - r_f \cdot f$

$$- \pi_o\{(1-a_g)(1-f) + (1-a_f)f\}$$

$$- \pi_a\{(1-r_g)(1-f) + (1-r_f)f\}]$$

d) Dividends and retained earnings due to Canadians:

$$p[1-r_g(1-f) - r_f \cdot f - \pi_o\{(1-a_g)(1-f) + (1-a_f)f\}$$

$$- \pi_a\{(1-r_g)(1-f) + (1-r_f)f\}]$$

The total of these four items is:

$$y = 1 - (1-w)(1-p)[1-r_g(1-f) - r_f \cdot f - \pi_o\{(1-a_g)(1-f)$$

$$+ (1-a_f)f\} - \pi_a\{(1-r_g)(1-f) + (1-r_f)f\}] = 0.7871$$

Revenue from the proportion of Canadian oil exported is

$xy = .1007$

(2) Foreign-owned revenue from a $1 increase in the oil price is:

$$1 - y = (1-w)(1-p)[1-r_g(1-f) - r_f \cdot f - \pi_o\{(1-a_g)(1-f)$$

$$+ (1-a_f)f\} - \pi_a\{(1-r_g)(1-f) + (1-r_f)f\}] = .2129$$

Revenue from the proportion of Canadian oil <u>consumed</u> in Canada is

$(1-x)(1-y) = .1856$

(3) Net additional payment to foreigners from a $1 increase in the oil price is

$(1-x)(1-y) - xy = (1-x-y) = .0849$ on the dollar

Where r_g = average royalty rate on crown lands oil production = 0.42

r_f = average royalty rate on freehold lands oil production = 0.125

f = proportion of oil production from freehold (i.e. non-crown) land = 0.20

π_o = federal corporate profits tax rate = 0.36

π_a = Alberta corporate profits tax rate = 0.11

a_g = resource allowance which oil companies are entitled to deduct from gross revenues from crown lands to arrive at taxable income for corporate income tax purposes = 0.25

a_f = resource allowance which oil companies are entitled to deduct from gross revenues from freehold lands to arrive at taxable income for corporate income tax purposes = 0.344

w = federal withholding tax = 0.15

p = proportion of total profits due Canadian shareholders of oil companies = 0.18

x = proportion of Canadian crude production exported in either crude or refined form = 0.128

16. The 42 percent is based on Alberta government estimates prior to June 1, 1979. The 12½ percent is really a maximum on freehold lands. A number of early leases signed with large freehold land-holding companies had royalties as low as 9 or 10 percent. Saskatchewan government royalties on crown lands are higher than 40 percent, but freehold lands--which are responsible for much more than 20 percent of total Saskatchewan production carry the same types of royalties as in Alberta. Consequently the Alberta figures for royalties and share of production from crown and non-crown land, when combined, will produce roughly similar ratios to those which pertain to Saskatchewan. In any event, Saskatchewan's oil production is so much less than Alberta's that slight differences from Alberta percentages are unlikely to alter the results very much.

17. Informal Alberta government estimate.

18. Revenue Canada, Information Circular 76-12R.

19. See footnote 13.

20. Based on informal National Energy Board estimates.

21. See footnote 15 for details of the calculations made.

The 8.5 cent per barrel cost is a trifle higher than the 7.7 cent estimate made in 1973 before royalty rates were increased and corporate tax provisions were amended, and without allowance for withholding taxes--which, at first glance,

may seem surprising. But the reason a cost still exists, and is larger than before, stems from the fact that a much smaller proportion of Canadian production is now exported. At the time of the earlier calculations, 59 percent of crude production was being consumed outside the country, as opposed to about 13 percent at present. Hence, more of the price increase must now come from Canadian consumers.

22. Consider footnote 15. In this case, the revenue loss per barrel from the proportion of Canadian oil consumed in Canada is \$15.25 (1-x)(1-y) and the revenue gain from the proportion of Canadian oil exported is \$15.25 xy, as before. However, in this case we must also charge the revenue loss due to the elimination of the export tax, which is equal to \$15.25 x per barrel. Thus the net loss is equal to \$15.25 (1-y) per barrel. With 1-y = 0.2129 and production at 650 million barrels a year, the resulting figure is \$2.11 billion. Again, of course, we are ignoring the substantial allocative benefits stressed by Thirsk and Wright, op. cit., 1977, and others.

23. L. Waverman, "The Two Price System in Energy: Subsidies Forgotten", Canadian Public Policy I (Winter, 1975), p. 87.

24. The Waverman article gives merit points for policies which do this within Canada, but neglects that a policy which encourages this internationally may also be desirable. Ibid. pp. 84-88.

25. Ibid., and Thirsk and Wright, op. cit., 1977.

26. This is not quite accurate since by no means all U.S. production is at world prices of oil. But this does not change the argument; it just reduces the amount of economic rents that foreign-owned firms in Canada might be getting in competition with foreign output.

27. There may, of course, be exchange rate implications here. But this is a separate issue which need not be introduced at this juncture.

28. Before answering this objection, it may be worth noting that higher energy prices cannot be supported on the basis that they are a means of conserving scarce domestic resources (as opposed to world resources) in any absolute sense. Domestic production will be expanded, not lessened, so that either imports may be reduced or exports expanded.

29. See Roseman and Wilkinson, op. cit., 1973, p. 49 and G. C. Watkins and Karen Sharp, "The Long-Term Cost of Alberta Conventional Crude Oil", The Journal of Canadian Petroleum (January-March, 1970), pp. 22-27.

30. E.g., A. E. Safarian, The Performance of Foreign-Owned Firms in Canada (Montreal: Canadian American Committee, 1969); B. W. Wilkinson, Canada's International Trade: An Analysis of Recent Trends and Patterns (Montreal: Private Planning Association of Canada, 1968).

31. These questions and several other related ones are discussed in a companion piece, T. L. Powrie and B. L. Scarfe, "The Optimal Savings Question: An Alberta Perspective", prepared for the University of Alberta conference on the Alberta Heritage Savings Trust Fund, October 18-19, 1979.

32. See Ibid., for more details.

33. See W. M. Corden, Trade Policy and Economic Welfare (Oxford: Clarendon Press, 1974), p. 217.

THE FEDERAL PROVINCIAL RELATIONS DIMENSION OF THE CANADIAN ENERGY ISSUE

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September, 1979

The Federal Provincial Relations Dimension of the Canadian Energy Issue

by

Douglas G. Hartle

The "new" arithmetic to one side, the Canadian energy issue involves at least four distinct arithmetics: the "pocket-book" arithmetic of the voter/consumer; the "seats" arithmetic of the politician (both federal and provincial), and the "bottom line" arithmetic of the investor. Last, and probably least in terms of its impact, is the economists' arithmetic that, to his mind, is the "real" arithmetic. This paper is concerned about the interplay among those who, each doing their own calculations with their own arithmetic, seek to maximize their benefits or minimize their losses in response to the unanticipated and unprecedented increase in the world price of oil. In particular, it seeks to identify an aspect of the energy question that is peculiar to Canada, at least among the industrialized nations: the juxtaposition of the concentration of the economically viable energy resources in one region of the country and the constitutional rights of the provinces (or more properly the residents of those provinces) that "own" these resources.

Canada (or more precisely some parts of Canada) has been a net winner from the unanticipated and unprecedented increases in the world price of crude oil starting in 1973. Collectively we are a net exporter of energy,(currently about $1.5 billion). Our exports consist primarily of natural gas but are partly offset by net crude oil imports. Our future reliance on imported oil is almost certain to increase, although the extent and duration of the increase is far from certain. Our natural gas exports are also certain

to increase should policy permit. Again, magnitudes and timing are up in the air. On balance, however, the higher price of energy has improved our terms of trade.

Our collective sense of self satisfaction must be dampened by two facts, however: Canada is heavily reliant on the prosperity of the world economy and especially that of the American economy. When they suffer as a result of the energy problem we suffer. Secondly, and perhaps less obviously, there is nothing quite like a massive windfall gain to cause dissention and bitterness in the family, however closely knit. The bitterness, indeed hatred, engendered among family members when the estate of a wealthy relative is being divided knows no bounds. Perhaps for the very reason that none if any of the beneficiaries in-waiting "earned" the assets, at least in the usual sense, the claims and counterclaims must be based on entirely subjective criteria: criteria that are usually highly charged emotionally and, hardly surprisingly, seldom fail to imply an allocation favourable to those who advocate them. The controversy surrounding the Canadian energy situation has all of these attributes and more.

With an intrafamily windfall the contest over shares is a zero sum game. What one relative gets is at the expense of another. The wealth of the family remains the same (if we don't count the human capital embodied in the diseased!); "only" its distribution is changed. The windfall to the Canada "family" as a result of the surge in international oil prices is similar to the bequest situation in some respects but substantially different in others. Like the family dividing a bequest, it is fraught with strong emotion. Unlike the family problem, however, the issue is not necessarily a zero sum game. Potentially, some could be better without other Canadians being worse off. There is a real danger, however, that the dispute over the gain and

losses will be "solved" by dissipating the potential gains in wasteful projects and/or by transferring them, more or less unwittingly, to non-residents.

This paper consists of three Parts. The first two Parts are divided into Sections. An outline follows. Space and other reasons have dictated that the short-term economic stabilization dimension of the issue are not tackled except in passing. This should <u>not</u> be interpreted as my indifference to that important dimension of the problem.

Part A . The Political Aspects

This part begins with a definition of the concept of net collective benefits arising from the ownership of non-renewable resources. It is argued that the net collective benefit should be maximized and the private benefit accruing to non-residents minimized. The division of the net collective benefit between the federal and provincial governments, or more precisely between the residents of the producing provinces and Canadian residents generally, is introduced.

Section 1: The existence of a federal form of government in Canada creates great complexities in devising a national energy policy. Lest the reader be inclined to favour too lightly unilateral coercive action by the Federal Government the rationale for a federal system is sketched in this Section. Minimization of coercion is the theme.

Section 2: Having explained the principles underlying a federal form, this Section crudely lays out the provisions in the Canadian Constitution that are particularly relevent in the tug-of-war over the division of the windfall gains arising from the rising world oil prices. The draconian measures available to both sides are discussed within a bargaining context.

Section 3: Voter attitudes in Alberta and Ontario are sketched in this Section because these vitally effect - and largely determine - the range within which bargaining is likely to take place. Data are presented to show the marked deterioration in the economic situation in Ontario and the converse for Alberta over the past decade or so. The tax systems of the two governments are compared.

Part B: The Modification of Optimal Economic Policies Under Canadian Federalism

In an attempt to sequester those aspects of the energy

issue that are, in a sense, universal from those that are unique to the Canadian situation this Part proceeds as follows: a set of policy proposals are advanced based on two criteria: allocative efficiency maximization and the maximization of the collective benefit from resource ownership under the assumption that Canada is a unitary state. The proposals advanced should be thought of largely heuristic. They have as their principle purpose the illumination of the kinds of modifications that may be necessary to accommodate the federal fact. These hypothetical proposals may not or may be without merit in a "real" sense. (Indeed, the author is rather pleased with some of them!)

The titles of the Sections in this Part are self explanatory.

Section 4:	Future Supply and Demand for Energy in Canada
Section 5:	Pricing to Induce conservation and substitution
Section 6:	Frontier Exploration
Section 7:	Non-Conventional Oil
Section 8:	Royalties
Section 9:	Public Transportation
Section 10:	Interpersonal Distribution of Income and Wealth

Part C: <u>A Possible Strategy</u>

This Part considers the disposition of the proceeds of a crude oil excise tax designed to capture the windfall gain from increases in domestic crude oil prices arising from unexpected increases in the world price. Abolition of sales taxes - retail or manufacturing are considered, and a refundable personal income tax credit is proposed. Proposal with respect to natural gas pricing and exports and industry subsidies are also advanced.

Part A: THE POLITICAL ASPECTS

In what follows we employ two terms: "collective assets" and "collective benefits". What we mean with respect to the former is that the residents of a jurisdiction collectively, own certain property rights. The proceeds from the alienation of those rights at market prices changes the composition of the portfolio of assets but not its value. The proceeds could be invested, one might suppose, in a perpetual inflation indexed bond and the annual interest allocated on a per capita basis among the residents. An alternative, we will also suppose, would be for the government to invest the proceeds in a public facility that accorded in perpetuity each of the residents an equal or greater degree of satisfaction. Ignoring many complexities, what we mean by "collective benefits" are flows of satisfaction of the kinds just described obtained by the residents of the jurisdiction that "owns" the mineral rights. Thus, when we allude to "governments" capturing collective benefits we seek to imply that these institutions are essentially "black boxes" that produce from such collective resources ownership a flow of satisfaction to individual resident in the jurisdiction.

A non-renewable resource situated within the territory over which the Government of Canada holds sovereignty is an asset in three senses:

(1) It is a collective asset of the citizens of Canada because of the recognition accorded by other nation states of the Government of Canada. This means that the laws of other nations do not have force or effect (at least directly!) within Canada. This recognition is accorded because the federal Government exercises <u>de</u> <u>facto</u> power. (Ultimately this means federal police and/or military control within the territory.)

(2) Unless already alienated, it is a collective asset of the residents of the province in which it is situated by virtue of the powers conferred on the province under the Constitution. (See Section 2)

(3) It is an exclusive right held by a person (corporate or other) either because ownership of the property right has been alienated or because the provincial Crown* has sold certain conditional rights to exploit the resource.

From a long-term point of view, the lion's share of the collective gross benefit derived from a non-renewable resource (asset) situated within Canadian territory can be derived from:

*Or the Federal Crown in the case of the Yukon and Northwest Territories. The east and west cost offshore mineral rights are of uncertain federal or provincial ownership although a temporary agreement has been reached on the division of any proceeds.

(a) the sale of the right to exploit the resource at a price that equals the present value of the expected market value of the future output net of the costs of obtaining the output;

(b) the taxation of the output <u>per se</u> and/or the profit derived from its extraction and sale (taxed in the hands of a corporate and/or a resident individual and/or by a withholding tax imposed on income flowing to non-residents); and

(c) the extraction and sale of the output by a government agency at a price that more than covers direct costs.

Offsetting such gross collective benefits are the largely inputed costs of the infrastructure requisite to production: transportation/communication/power systems, and the extra social capital required, if any, that is not financed by the producers.

When the resource is exploited by the private sector and the <u>net</u> collective benefits are not maximized, the result is either a transfer of wealth from some Canadian residents to other residents or, if the ownership of the enterprise is not held by residents, a transfer of wealth from Canadian residents to non-residents. Conceivably, under the latter circumstances, if the foreign held resource exploiting corporation did not bear the infrastructure and social capi-tal costs described, Canadians collectively could be made worse off by not leaving the resource in the ground. Given the overwhelming preponderance of foreign owned and control-led oil corporations in the Canadian petroleum and gas industry, the problem of realizing the maximum net benefit for Canadians is by no means lacking in materiality. It is assumed that capturing the maximum net benefit for Canadians is universally accepted by Canadians.

It also might be accepted by all Canadians that, ignoring the distribution of the net collective benefit from the Canadian possession of a non-renewable resource: individual Canadians should, in principle, be prevented from appropriating for themselves any part of the collective net benefit. However, there certainly are wide divergencies of view as to the application of this principle. Some argue that, in a dynamic and uncertain world, unless substantial net windfall gains can accrue to individuals, entrepreneurship and risk taking will be stifled and that this will in turn ultimately reduce the future net collective benefit.* Although there seems little doubt that there is an element of validity to the argument, it is painfully obvious that its proponents, if given their heads, would apply the "principle" in such a way that they would not only capture for themselves the net collective benefit but also inflict net collective losses on other Canadians by not bearing the requisite extra costs. The consequence of the ambiguity of the principle in application is endless rancor and controversy concerning the "appropriate" taxation of the extractive industries in all democratic nations, including those that can proceed as though they were unitary states. (This is roughly the American situation with respect to oil.) Indeed, to suggest that the battle between individual and collective interests is confined to words is a mistake. The stakes are so large that intimidation, bribery and probably worse have been involved in the past, at least in some nations.

Assuming that a public enterprise could be managed as knowledgeably and efficiently as a private enterprise in the petroleum industry, and that the decision of the management of the public enterprise reflected the same preferences

*The windfalls gains resulting from the unexpected and unprecedented increase in world crude oil prices hardly seems comparable to those arising in convention markets.

towards risk, the "appropriate" tax regime question could be side-stepped. The ownership, extraction and sale of petro-leum or gas could be assigned to a government agency. The gross profit of such an agency would, by definition, include the collective benefit. Conceptually, however, this gross profit should be decomposed into three parts:

(1) the value of the resource *per se*

(2) the opportunity cost of the capital and labour employed in finding and extracting the resource

(3) the taxes foregone because the private sector is not involved.

To put the matter in a slightly different way, assuming the effective corporate tax rate were the same in all industries, from the gross profit should be subtracted an amount equal to the before-tax rate of return prevailing in other industries multiplied by the capital invested by the public enterprise. The present value of the balance will be the value of the resource. This would be the net collective benefit of the possession of the resource - assuming all the additional infrastructure and other costs were taken into account in calculating gross profits. The gross profit of the public enterprise would accrue, of course, to the public treasury and would permit tax reductions and/or improved government services and/or increased transfer payments that would constitute a kind of "dividend". Part of the gross profit might well be reinvested in the enterprise itself through the retentions of earnings.*

* We will ignore the sticky question of the imputed rate of interest that is appropriate in assessing the "profits" of public agency projects.

Unlike many others, I am not convinced that the foregoing assumptions concerning public enterprise management are altogether unrealistic except with respect to risk taking. And even here the difference need not be great if ministers do not have to account for every dollar spent. With a degree of autonomy, some managerial "mistakes" then can be permitted a public agency . I am convinced, however, that the managements of large widely held private enterprises and of "independent" government agencies (e.g. CDC, Petro-Can, and AECL) are both difficult to control. The interests of managers and shareholders are not always (usually?) identical. When this is the case, the personal interests of the managers dominate, not surprisingly. If anything, the management of Crown corporations is frequently under less scrutiny than private sector management.

As though the foregoing problems were not sufficiently complex, as stated before, Canada faces a unique conundrum. Even if the Canadian net collective benefit were maximized, how should it be divided between the residents of the provinces where the resources are located (via the relevant provincial governments) and the residents of other provinces (via the Federal Government)? The severity of problem is immensely intensified by four facts: most marketable petroleum resources are found in Alberta, and to a much lesser extent in Saskatchewan and British Columbia; the rights to those resources are held by the respective provincial governments; the power to regulate and control the resources within the province, including controlling exports from the province, also rests with these provincial governments; it is doubtful that the Federal Crown can tax a Provincial Crown, to use the language of the law. Clearly, if the whole of the net collective benefit were captured by a few provincial governments on behalf of the residents, the oil and gas deposits would disappear, to all intents and

purposes, as national assets. For non-residents of the producing provinces the resources might just as well be shifted south of the Canadian border or the border shifted north to encompass the resources.

Strangely enough, if the net collective benefit were to be completely captured by the residents of the producing provinces only, the residents of other provinces probably would be better off if the collective benefit were small and most of the benefit were captured by Canadian individuals in one form or another. Although the federal corporate and personal income tax systems are <u>most</u> imperfect instruments for the purpose, <u>some</u> of the collective benefit captured by individual Canadians eventually would accrue to Canadians not residents in the producing provinces through, if nothing else, the deemed realization of capital gains at death.

There is a real danger that, in the fight between the producing and consuming provinces (through the federal government) over the distribution of the collective benefit, the private benefit will gain at the expense of the collective benefit. Or, what is even worse, the total benefit will be reduced by either squandering the asset through inordinate consumption brought about by prices that are too low or by hoarding the resource as though time were not also a non-renewable resource for each individual. This is the issue addressed in this paper. Because the reader might be inclined to jump to the conclusion that the federal form of government is at best a nuisance and at worst a major barrier to efficient economic policies in the energy field, it might be well to restate briefly the rationale for this governmental form. This is done in the next section. Federalism has important virtues and should not be dismissed as the source of needless and irritating complexity.

SECTION 1: THE RATIONALE FOR A FEDERAL FORM OF GOVERNMENT

If all of the residents of a sovereign state had identical tastes and preferences there would be no rationale for a federal form of government although there might well be a justification for some delegation of authority to local authorities to achieve greater efficiency in coping with circumstances that differ from area to area. Even if the residents were diverse in tastes and preferences but there were no geographic clustering* of those who differed less among themselves than they differed from those living in other areas, there would be no rationale for a federal system. However, when such geographic clustering is present, it is possible that a constitutional division of powers can be devised that potentially will make some residents of a nation off without making others worse off. This follows because non-unanimous collective decisions are, by definition, coercive for the minority. By the assignment to provincial (state) governments of exclusive powers and responsibilities that permit interprovincial differences in collective decisions in matters where there are signficiant geographical differences in tastes, the potential degree

* The clustering can come about by individuals voting with their feet and moving to the area with the most attractive public sector from their point of view. It can also occur because of the inculcation of common values through prolonged proximity.

of coercion can, under some conditions, be reduced while retaining the economic benefits of the larger unit. The necessary conditions are set forth below:

The responsibilities and the powers assigned to provincial governments must:

- not empower provincial governments to erect barriers to the interprovincial movement of persons, goods and capital;

- not assign powers or responsibilities to provincial governments that would permit the residents of one province to impose costs on the residents of other provinces that they do not bear themselves; and

- not assign responsibilities to provincial governments that, if fully borne by the residents of one province, would accord benefits to residents of another province, for this would result in the underfulfillment of the responsibility.

The exclusive powers assigned to the central government must include control of national borders with respect to flows of people and goods and control of the money supply. It also must be responsible exclusively for international relations and for the provision of services that provide benefits to the residents of more than one province (e.g. defence, interprovincial transportation, communications and research)

and be assigned the taxing powers necessary to finance the provision of these kinds of services. More disputatiously, the central government must have the power to preempt temporarily the constitutional powers of the provinces when necessary to meet exigencies in a state of "emergency" (somehow defined).

Excluding the use of force, and ignoring that most important intangible "national pride", for the federation to survive the majority of the residents in each state must perceive that, on balance and over time, they are better off being part of a federation then they would be if they were governed autonomously. This means, in effect, that they must believe (consciously or unconsciously) that the gains from the avoidance of economic barriers, the economies realized by the common provision of some services and the increased international bargaining power of the larger unit more than offset the greater coercion (relative to complete provincial autonomy) that can and often does arise through the exercise of central powers and through the central governments response to its exclusive responsibilities. Coercion by the central government can arise not only because of the geographic specific differences in tastes and preferences we have already mentioned. The assets held by individuals resident in different provinces differ in a non-random manner with respect to composition and average value. The interpersonal distribution of holdings also differs from province to province.

In consequence, each central government policy, although in principle it applies equally across the whole nation, does not have the same effects in each region even on a per capita basis. Because there are significant differences among the residents of regions with respect to tastes, wealth and physical circumstances (e.g. climate and topology) virtually all central policies benefit (hurt) the

average resident of one or more provinces more than the average resident of others. This is not unique to central government policies, of course. An act of a provincial legislature is most unlikely to have a homogeneous effect in every area of the province.

The competition among political parties for votes usually restricts the extent to which the residents of a province, or groups of provinces, are persistently coerced for the benefit of the residents of other provinces. In the endless sequence of policy decisions a kind of logrolling takes place. For most groups, most of the times the losses under one policy are offset by gains under a subsequent policy, ad infinitum.

Just as Adam Smith's invisible hand of the pursuit self interest within a market system can produce a beneficial unintended private result, so can the pursuit of self interest by politicians working within a federal political system result in sequential logrolling that minimizes the degree of coercion (directly and indirectly and overtly or covertly). Ideally this sequential logrolling will leave the residents of each region with a net benefit over time from their membership in the federation relative to complete autonomy.

It is crucial to realize that many of the items in the voter's benefit/cost calculus are intangible and that individual perceptions of net benefits are the only reality. If the residents of a region believe that they have been persistently coerced by the residents of other regions, and that this will continue in the future whatever legitimate actions they take within the existing political system, the demand for violence or subversion will emerge and/or a demand for greater regional (provincial) autonomy and/or for secession from the federation.

It should be apparent that although a federal form of government can, in principle, make some residents of the federation better off without making others worse off, it does not follow that this will necessarily be the outcome. The majority can still use the federal powers to coerce the minority (not provide the losers with adequate compensation) by electing governments that persistently adopt coercive policies from the point of view of the relatively few residents of a particular region or province. Needless to say, the degree of central government coercion of the residents of a province is likely to be less and/or the degree of compensation greater the more decisive the votes of the residents of a region in the election of national parties. It is also true that particular provinces can coerce the majority. This can occur if the province with a minority of the national population has some kind of monopoly power that allows it to exact, on behalf of its residents, all of the benefits from the federation for itself. Albertans, as westerners, probably believe that the former situations prevailed for them because of the rapacious easterners. Ontario residents, and other easterners, probably believe that Albertans are now engaged in the latter action.

In the next Section we will crudely set forth the basic characteristics of the Canadian constitution relevant to the energy issue in order to highlight the differences between the federalism rationale and the Canadian fact. Before proceeding, however, it is important to recognize that the conventional rationale for a federal system does not provide any specific guidance with respect to the treatment of the natural resource question. What it does suggest, however, is that a federation can provide a kind of efficiency gain such that some can be better off without making anyone worse off if the losers are compensated. The danger is that if the minority attempts to use its quasi-monopoly powers to exact all the benefits from the federation, the majority

will coerce the minority so blatantly that the federation will collapse. In the next Section we consider the constitutional basis for the quasi-monopoly powers of the oil and gas producing provinces. But before doing so we wish to draw particular attention to a dynamic phenomena that is not reflected in the "pure" but static theory of federalism that has been briefly outlined.

At the outset of the Section we referred to the clustering of individuals with like tastes and preferences as a necessary condition for a federal state to confer a benefit relative to a unitary state. This clustering can come about (as suggested in an earlier footnote) either because "birds of a feather flock together" or because birds that live together for a protracted period eventually have the same feathers. This is a crucially important dimension of the new found wealth of the western provinces generally and, in particular, Alberta. It is obvious to all that the economy of the Province is more buoyant then that of any other - and some, indeed, are quite depressed from a job opportunity point of view. As we will document later, taxes in Alberta are much lower in Alberta than elsewhere in Canada, even though the quantity and quality of public services is almost certainly higher there. Here is a synopsis of the implicit advertisement: "High paying job opportunities with unlimited prospects; excellent collectively provided benefits provided with low, low taxes; unsurpassed recreation facilities at your backdoor; hospitable people. Apply in person in the Province of Alberta". Many Canadians have responded to this advertisement. They continue to respond at an increasing rate. And why not? Not too much is said about Edmonton winters!

Although put facetiously the point is important. If the windfall gain generated by the increase in world oil prices were shared by all Canadians <u>wherever situated</u> the in-

ducment to migrate to Alberta would be relatively modest. Conversely, if all the net collective benefits were retained by the Province of Alberta they would, in the fullness of time, be shared by the migration of other Canadians to that Province. Because ready access to markets largely determines industrial location the migration will be exponential, with large urban -industrial centres rapidly developing in the Province. As a consequence, those who have residential-industrial property in prime locations will capitalize and "privatize" the collective wealth of the Province through higher and higher land prices. The immigrants to the Province drawn to the rapidly expanding centres will also necessitate exponential increases in the social capital and other government expenditures that will, <u>eventually</u>, lead to a drawing down of marketable assets and ultimately higher tax rates in Alberta. In short, unless the Province is able to close its borders to people, a slow but inexerable equilitrating process will occur should the collective benefit be sequestered entirely by the Province.

Section 2: The Canadian Constitution

The Canadian Constitution is embodied in the British North America Act (as amended), a statute of the Parliament at Westminster, earlier decisions of Judicial Committee of the Privy Council (again Westminster), certain decisions of the Supreme Court of Canada, and Canadian parliamentary and other practices including federal/provincial consultative practices. The Constitution has proven to be remarkably durable probably because it has proven to be remarkably flexible, some Canadian folklore not withstanding. Painfully, slowly and oft times with irritating rhetoric, bombast and gamesmanship, the conflicts among the provinces and between one or more of the provinces and the federal Government, and thereby directly or indirectly between and among the innumerable interest groups that comprise the federal and provincial electorates, have been resolved or buried without significant violence. Ever shifting alliances, coalitions and log-rolling inevitably have been the order of the day for over 41,000 days - if one counts a few of the days devoted to negotiating the terms of Confederation! The point we wish to make is not that the Canadian constitution is in any sense ideal. However, it is, as they say, "the only one we've got". It does determine to a considerable extent the basic structure and processes by which major conflicts are resolved in this country and hence can be assumed to affect, for better or worse, the outcomes of most of our most vital collective decisions. This is particularly likely to be valid, for reasons to be discussed later, of the energy issue. It is important for the reader to bear in mind that it would not be surprising if the Constitution (broadly defined) were altered as a result of the energy issue. Indeed, the political problem this issue creates is so acute, and hits so close to the heart of the alliance, that it could conceivably lead to a break up of the federation as we now know it. It is also important to recall that

the "constitutional problem" is of a legal nature in only the most superficial way. If there were a way of consensus on what should be done, anything could be done by federal/ provincial agreement. The constitution would not be a barrier. Conversely, in the absence of a consensus as to the desired resolution of the problem, there can be no agreement about a constitutional change that would remove an existing constitutional barrier to a particular course of action. Finally, it must not be forgotten that circumstances alter cases in constitutional matters like all others.

The provisions of the Canadian Constitution that are particularly relevant to our purpose are now briefly and crudely summarized.

(1) Sections 109 and 117 of the BNA Act gave the original four provinces ownership rights which included mineral rights, over unalienated Crown lands, within their boundaries. When the Western provinces evolved from the North West Territories (Alberta in 1905), "the first economic colony.... of the central Canadian heartland" in Donald Smiley's* phrase (BCIEPA, p. 65), the ownership of natural resources was retained by the Federal Government. It was not until 1930 that by mutual agreement the Bennett Government (Bennett having come from Calgary!) petitioned Westminster for an amendment of the BNA Act transfering land ownership to the Western provinces.

One might speculate that the turn of the century when Saskatchewan and Alberta came into being, agricultural land was <u>the</u> natural resource of signifiance in the region.

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* Smiley, Donald V., "The Political Context of Resource Development in Canada" <u>Natural Resources Revenues: A Test of Federalism</u> (Edited by Anthony Scott), Published for: The British Columbia Institute for Economic Policy Analysis, by the University of British Columbia Press, 1976, page 65.

Presumably the federal government had no intention of giving this asset to the new provinces for the exclusive benefit of the relatively few residents at the time. By 1930 agricultural settlement in the region was virtually complete and the transfer of land ownership to these provinces by the Federal Government was no doubt thought to be primarily a symbolic gesture. Some gesture! In any event, provincial land ownership and ownership of the minerals located on these lands confers on the province the powers of "management and sale" under Section 92(5) of the BNA Act. This means that the Provinces can refuse to sell the minerals they own for export out of the province. Furthermore, Section 92(13) accords the provinces exclusive powers over the enactment of laws relating to "property and civil rights" in the province. Provincial ownership plus these extreme-ly important additional (legislative) powers, undoubtedly gives the provinces the constitutional power to control and regulate within the province each and every aspect of the petroleum resources found in the province.

(2) Provinces can only impose direct taxes (Section 92(2)). This means, particularly, that they cannot impose taxes that would discriminate against non-residents of the province nor can they adopt laws that would constitute the regulation of inter-provincial or international trade. These limitations were reaffirmed by the recent Supreme Court of Canada decision against the Government of Saskatchewan in the Canadian Industrial Gas and Oil Ltd. case and the Central Canada Potash case.

(3) The government of Canada can, however, regulate and control all aspects of these resources if and when they are exported from a province (Section 91(2)). The federal government, in addition, has, with one possible exception, unlimited taxing powers (Section 91(3)). The possible exception relates to the federal taxation of an agency of a provincial government. Although the latter issue has not been decisively settled by the Courts, it has been argued that the Crown in right of Canada cannot tax the Crown in right of a province (Section 125).

(4) Section 92(10) gives the federal government jurisdiction over "works or undertakings connecting the provinces with any others of the provinces, or extending beyond the limits of the province". Interprovincial pipelines clearly fall under federal jurisdiction.

The federal government has the Constitutional power to declare, retrospectively or prospectively, a "work of undertaking", although wholly situated in a particular province, "to be for the general advantage of Canada or for two or more of the provinces". (Section 92(10)(c).) This power has been exercised to extend federal control over all aspects of uranium. From a strictly constitutional point of view, and ignoring all political realities, the federal government could thus gain control of, say, all oil and gas installations (as distinct from the resources themselves) within the Province of Alberta.

The clause preceding the items ennumerated in Section 91 of the BNA Act gives the federal government power "to make laws for the Peace, Order and Good Government of Canada." This has been interpreted by the Courts to mean that by declaring a national emergency to exist the Government of Canada can, in effect, preempt the constitutional powers of the provinces for the duration of the emergency.

The powers cited in the previous two paragraphs might be labelled the draconian powers of the federal government. (The powers of federal disallowance of provincial statutes is so draconian as to be thought to have become anachronistic.) The provincial power to refuse to export petroleum and gas from the province, a power that seems abundantly clear with respect to the output from lands that they own, and the power to levy direct taxes (e.g. royalties) without limit, can likewise be labelled the draconian powers of the petroleum rich provinces.

The essence of the present complex constitutional situation that has just been summarized in such "bare bones" terms is that the effective (i.e. non-draconian) powers under the constitution of the Government of Canada and of the Province of Alberta are so nicely balanced that, except for draconian moves on either side, each can offset, or more than offset, the policy inititatives of the other. This was brought home by the tug-of-war over petroleum resource revenues that followed the increase in the world price of crude oil in 1973. Alberta increased its royalties to capture some of the windfall gains (rents) for the Province. But because royalties were deductible for federal (and provincial) corporate tax purposes, this had the effect of preempting federal corporate tax revenues. The federal government retaliated by disallowing the deduction of royalties altogether. This reduced the profitability of investments in petroleum exploration and development and resulted in a sharp decline in those activities. (Probably this was primarily a strategic move dramatized by the large producers.) After a painful confrontation the federal government indirectly backed off, to a degree, by introducing a resource allowance that, in effect, reduced the federal rate of corporate tax on resource profits. Both sides have expressed grave concern that this kind of competition for resource rents can do great damage by increasing the level of uncertainty faced by investors.* The federal government has been adamant, however, that it must secure some of the rents generated by unanticipated increases in crude oil prices for the benefit of Canada as a whole.

A subtle mind is hardly necessary to grasp the mountainous point that the federal use of the draconian measures described above depends primarily on the degree of public concensus concerning the severity of the problem and of the necessity for the deployment of such bludgeons. Although

* "Federal-Provincial Resource Taxation Review" Joint report by federal and provincial officials to First Ministers and Resource Ministers, First Ministers' Conference on the Economy, November 27-28, 1978. Document Number 800-9/018.

party loyalty is, for reasons that need not concern us here, extraordinarily strong under the Canadian Parliamentary system, even a majority government could not be certain to gain majority support for these measures unless public support was overwhelming. Even then, because the degree of coercion would be so great, with a significant minority of Canadians (certainly those resident in Alberta!) violently opposed, one might suppose that a majority Government attempting to exert its full Constitutional powers could be split. Some members whose specific interests were not adversely affected by the draconian action might well object to the means employed under the circumstances. Should party loyalty survive such a test, a federal party that resorted to draconian measures without the strongest support from the vast majority of voters almost certainly would not survive the next general election.

On the Alberta side, probably the most draconian measures available include the "nationalization" of the petroleum industry in the province this would put to the test the ambiguous federal taxing powers with respect to the provincial Crown and/or the imposition of stringent restrictions on exports from the province and/or increasing royalties or similar payments that could, under the current federal tax regime, affectively reduce exploration and development. The first measure would presumably find little public support among the residents of Alberta who seem committed to private rather than public enterprise. However, with enough provocation from outside the province this situation might change dramatically. The second measure, an embargo on exports from Alberta could conceivably be invoked only briefly and only in a situation of extraordinary confrontation. If invoked prior to federal provocation (as seen through Albertan eyes) one might expect a federal escalation that involved recourse to one of its draconian

powers already described. If invoked by Alberta in response to a hostile federal act, it is difficult to see how some military/police action would not ensue.

Some combination of a reduction in exports from the province plus a slowing down of exploration and development (the third and last of the provincial draconian moves we have identified) would seem more likely. The Government of Alberta could argue that it would reduce exports to protect more strictly its depleting resources and that it needed higher royalty revenues to "save for the future". Furthermore, it could try and argue that too rapid a pace of exploration and development was putting undue strains on the economy and social fabric of the Province. As made abundantly clear later, the Provincial Government of Alberta already is overwhelmed with the flood of cash. Given that the prices of oil and gas are almost certain to rise in the future both in real and nominal terms, a strong argument could be made that the net worth of the Province would be maximized by leaving more of the oil and gas in the ground.

There are, needless to say, other Constitutional instruments available to both parties and certainly many other more subtle and probably much more effective strategies than those we have sketched. Our purpose in raising the issue is not to imply that the energy crisis need lead to anything as bellicose in federal-provincial relations as the possible scenarios we have sketched. We do want to emphasize, however, something that needs to be borne in mind in considering the issue before us: "the Constitution" is not a fixed and certain set of rules. Rather it is a constantly changing set of rules and that the meaning and effectiveness of the rules at a point in time depends critically on public perceptions of the issue at that time. Most of the time for most "small" issues the Constitution can be taken as given. Actions by either the federal government or a provincial

government of questionable legitimacy are rare and the determination by the Courts apparently settles the matter while, at time, remolding "the Constitution". Similarly, when there is a high degree of public concensus about a particular policy issue, federal/provincial agreements can be reached after much bargaining that, in effect, make the Constitution of little significance. It is when there is a strong division of opinion about what is widely perceived to be a matter of great importance that the draconian powers of the parties become relevant because they legitimize, more or less, certain kinds of highly coercive actions in, what amounts to, an extremely complex and emotionally charged inter-governmental bargaining process. This process can have, as one of its outcomes, change in one or more Constitutional rules.

To put the matter in a slightly different way, the Constitution is to federal/provincial bargaining what labour legislation is to labour management relations. The Constitution provides the provinces (labour) with certain rights that increase their bargaining power vis-a-vis the federal government (management) at least in the sense of bringing the latter either to the Courts or to the bargaining table if legitimacy is to be maintained.

However, the analogy quickly collapses if pushed too far. The voters are simultaneously residents of both a province and of Canada. This means, of course, that they are, in a sense, both on the labour side and on the management side. The result can be a peculiar kind of voting paradox. A majority Federal Government can claim that it speaks for a majority of Canadians on a specific issue and a majority Provincial Government can claim that it speaks for the majority of the residents of that province when it expresses a contrary view. Actually, unless the specific issue completely dominated both the preceeding federal <u>and</u> provincial

elections so that both could be construed as referenda, a confrontation can result between the Federal Government as a party organization and one or more Provincial Governments, also as party organizations, where the parties have, in fact, little if any support for the opposing stands they have taken on the specific issue. However, as far as petroleum resources are concerned, the interests of the Alberta voter are so overwhelming large and obvious, as is the legislative majority of the present Government of Alberta, there seems little doubt that unless it behaves in some extraordinar manner it can and will speak, and be thought to speak, for the vast majority of Albertans in any energy policy debate. The minority federal government, in part of course, because it is also the national government to Albertans and the minority Government of Ontario are unlikely to be able to muster such a common front.Relative numbers are important, however.

In petroleum resource terms, Alberta is extremely rich relative to the other provinces. But as yet Alberta is population poor, at least from a proportionate represent ation point of view. The vast majority of other Canadians are virtually certain to perceive that they would gain by putting pressure on their respective provincial governments and their federal government to resist oil and gas price adjustments that would increase the income and wealth of the Government of Alberta and Albertans at their expense. Not to mention the oil companies! This will be contained in the Atlantic provinces by the hope of offshore oil and gas and the possibility of more generous equalization payments.

As will be discussed later, although the majority might through such a strategem preclude an immediate loss for themselves and thereby a gain for Albertans and the petroleum corporations, the result in the long run is bound to be a greater aggregate economic loss, in particular because

demand will not be constrained by higher prices that reflect the greater scarcity of oil. The ultimate political cost of such a strategy might well be even greater, for the rage that would be engendered among Albertans is frightening to contemplate.

Part A: Section 3 Voter Attitudes

The current set of policy decisions with respect to energy threaten, more than most, the existence of the Canadian federation. Unlike Quebec's long-standing dissatisfaction with the status quo that most Anglophones claim not to understand (which is, of course, the very reason for the dissatisfaction!) what is "happening in Alberta" increasingly is being understood all too well. The pocketbook, the thermostat and the gas gauge speak languages that Anglophones do not lightly dismiss.

The formation of a federation is, of course, a political act: the negotiation of a kind of overarching contract that purports to resolve the conflicting interest of quasi-autonomous groups with the promise that there are gains to be had that more than offset the losses. Over the years the residents of all of the provinces except Ontario have, more or less continuously, with greater or lesser degrees of intensity, asked themselves whether or not the federation provided them with a net benefit. Often enough they came to the conclusion either that is was a net burden or, perhaps, more frequently, they firmly believed that if they were not worse off, Ontario had preempted a disproportionate share of the benefits.

More than half of Canada's population does not reside in Ontario. Almost by definition this means that a majority of Canadians would like to see "Ontario" get its comeupance.

Perhaps for the first time since Confederation, the economic dominance of Ontario is threatened by Alberta's energy bonanza. The result is a political problem of the first order of magnitude. At the federal level, no party can form a government without strong support in Ontario. At the

provincial level, no party can form a government in Ontario while seeming to stand idly by while Ontario becomes a "have not" province. Albertans are adamant that they keep virtually everything for themselves. The other provinces, no doubt revelling in Ontario's discomforture, are standing by watching the battle with some of the premiers seeking to shift the blame for higher energy costs elsewhere while looking for "solutions" that would provide them with politically costless funds.

The "solution" to the conflicting interests involved must, of course, ultimately be a political solution. And political solutions invariably and primarily involve voter perceptions. In these matters the voter's perceptions of reality are the politician's reality. And in this issue, voters in different provinces have widely divergent perceptions of the situation. Casual observation (in part based on a Prairie upbringing) suggests that the people of Ontario and Alberta have completely different perceptions of each other. And of "the facts".

For many, many decades a high proportion of Albertans have been utterly convinced that "the East" and most especially "Ontario" became wealthy at their expense. Many, and perhaps most, Albertans firmly believe that "Bay Street" has conspired to control the governments of Ontario and, to a substantial extent, the federal Government in order to raise the prices of the goods and services Ontario sold to the West and to lower the prices of the things bought from the West. They are also absolutely convinced that this "conspiracy" included the denial of economic development to Alberta in order to provide a captive market for Ontario goods and cheap raw materials for Ontario businesses. In short, Albertans, and other westerners too, believe that they have been treated as a colony of the central, industrialized part of Canada.

All of the foregoing beliefs are supported in the minds of Albertans by their version of the "facts" - a version of Canadian history evolved by Albertans in their newspapers, speeches and endless discussions of the subject with one another. This subject has dominated most of their conversations related to political or economic matters. Nothing unites a group like a perceived common enemy. Having the almost universal conviction that they have long been consciously exploited by "easterners", the majority feel quite justified in "getting their own back" now that the Golden West has become a reality rather than a dream.

Because petroleum resources are non-renewable, and because Alberta's conventional crude oil stocks are declining (if secondary and tertiary recovering is ignored!), Albertans have convinced themselves, after little persuasion, that the astronomic increase in provincial revenues from this source is only temporary. In their view, due concern for future generations of Albertans dictates, therefore, that the provincial government save a substantial part of these windfall revenues as a legacy. The capacity to justify one's own self seeking behaviour knows no bounds, of course. The reality is that while Alberta's conventional oil stocks are declining (and ignoring the qualification set forth in the foregoing parenthesis), the Province's resources of renewable gas are increasing dramatically in response to higher prices. To be specific, the Alberta Energy Conservation Board (hardly a radical group) in its most recent <u>Annual Report</u> (August, 1979) acknowleged a 4.4 billion cubic foot addition to the Provinces gas resources in the year past - more than twice the amount produced that year. With higher conventional crude oil prices the Province's heavy oil deposits, bituminous sands deposits and vast coal deposits are now of increasing economic value (particularly when their development is largely financed with federal largesse - which is to say at the expense of Canadian tax-

payers, generally). In other words, although Albertans are selling off the highway frontage of the family farm by exporting conventional oil, the value of the undercultivated and uncultivated acres at the back of the farm is rising even more rapidly. Even without saving for the future in the ways described, the wealth of the Albertan family is rising like a skyrocket. The brutal fact is that the "legacy" provides a semi-respectable rationale for an attitude on the part of some Albertans better described as: "its ours, we deserve it and we'll damned well keep all of it for ourselves". Generations of resentment coupled with blatant self interest make for strong attitudes!

The vast majority of Ontario voters have been completely, and no doubt smuggly, indifferent to the Westerner's views of them. To the limited extent that they were aware of these views they find them peculiar to the point of being laughable. It is not that the residents of Ontario have a strongly held contrary interpretation of Canadian history. Generally speaking, they have no comprehensive knowledge of, much less interpretation of, the history of Canada and the place of Ontario in it. Westerners seem unaware of the massive immigration to Toronto in the past three decades that has radically changed the cultural climate. Ontario residents do not think of the West as "their colony" any more than they think of themselves as being a British colony - a quaint notion now a days in Ontario. They certainly do not suffer from guilt feelings towards the West or the East for that matter for they can think of nothing they, personally, have done to hurt the residents of other provinces. If anything they feel warm and glowy when they contemplate their past benevolence. To their minds, the past preeminence of Ontario was a gift from God augmented by their diligence not the spoils of piracy. They certainly do not think of themselves as part of a conspiracy to exploit the West or anyone else.

To the extent that Ontario voters have played an important role in federal politics, they would accept this as only just and proper in terms of Ontario's size, location and economic importance. Probably many Ontario voters would think their Province had had too little influence in Ottawa relative to Quebec. That the other eight provinces have any influence at all is the source of some astonishment.

As for the "Bay Street" conspiracy, whatever that is, it is probably true that a higher proportion of the residents of Ontario are more resentful towards "Big Business" than those in Alberta. Albertans seem to overlook the fact that what "Bay Street" does to them as consumers it also does to consumers in Ontario. Moreover, a sizeable number of Ontario voters work on the production lines operated by "big business". Many of these workers think of themselves as being "ripped off" on the job by management and not certainly part of a conspiracy to rip off westerners. Stereotypes being what they are, neither groups thinks of the other as consisting of individuals both as similar and diverse as themselves.

It is obviously completely out of the question to attempt an analysis of why per capita incomes have been persistently higher in Ontario than in Alberta until recently. Nor is it feasible to assess on a federal policy-by-federal policy basis who gained and who lost on a province-by-province basis over the previous eleven decades. Because the political process inevitably involves perpetual log rolling compromises, it is questionable that a policy-by-policy analysis can do more than supply some badly needed perspective. What is needed, and the author obviously cannot meet the need, is a comprehensive and objective history of

the economic development of the West. An objective history would help us understanding the past. It would serve neither to delineate the villains and heroes nor constitutes a cumulative account of the scores to be settled. When well executed, history is like the best of the Shakespearean tragedies: personalities and circumstances being what they were the outcome was inexerable.

Be that as it may, even the obvious economic trends of the immediate past are probably not fully perceived by Canadian residents either in Alberta or Ontario. While I certainly have no firm evidence to support the contention, I believe that neither group fully appreciates just how far the relative economic position of Ontario had declined in recent years. The data provided in Table I summarizes the situation for the period 1968-77 (the latest date for which consistent data are available for all series). Clearly over the period the Alberta economy has rapidly gained ground relative to the Ontario economy. Not only that, but Alberta's relative position has been improving at an accelerating rate.

The changes in the revenues and expenditures of the two Provincial Governments show an even more dramatic disparity, as displayed in Table II. From 1973 to 1977 Ontario revenues grew at an annual rate of about 14 per cent: those of Alberta grew at a whopping 31.6 per cent! Despite the fact that the current expenditures of the Alberta Government have been growing much more rapidly, in 1977 (the latest date for which data are available on a National Accounts basis) Alberta saved $1.6 billion while Ontario borrowed to the tune of about $0.8 billion.

The reason for the differences in revenue growth are obvious. Total natural resource revenues (in millions of dollars) changed as follows in the two provinces.*

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* Source: Appendix Table .

Table I

Population, Personal Income, Provincial Income, Unemployment Rate, Inflation Rate, 1968-1977

	Ontario				Alberta			
			Compound Growth Rates				Compound Growth Rates	
	1968	1977	68/78	73/77	1968	1977	68/78	73/77
Population[a]	7.306	8.3735	1.53	1.34	1.526	1.8997	2.46	3.07
Provincial Income								
Total[b]	23,496.3	66,130.8	12.18	13.38	4,528.3	18,923.0	17.22	21.18
Per Capita	3,216.03	7,897.63	10.50	11.88	2,967.43	9,961.05	14.40	17.57
Gross Domestic								
Total[c]	30,771.4	84,651.4	11.90	13.05	5,828.7	23,479.3	16.74	20.79
Per Capita	4,211.80	10,109.44	10.22	11.56	3,819.59	12,359.48	13.94	17.19
Personal Income								
Total[d]	22,844	67,739	12.84	14.16	4,111	14,672	15.18	18.38
Per Capita	3,126.75	8,089.69	11.14	12.65	2,693.97	7,723.32	12.41	14.85
Percentage of Canada								
Federal Basic Tax (PIT)[1]	45.17	40.26	-1.27	-2.10	6.99	9.62	3.61	6.92
Corp. Taxable Income (adj)[2]	45.23	36.38	-2.39	-5.01	7.91	22.61	12.38	21.81
Unemployment Rate	3.6	7.0	7.67	12.96	3.3	4.5	3.51	-4.01
Inflation Rate (Toronto & Calgary) (1971 = 100)	90.59	157.3	6.32	10.08	91.03	158.0	6.32	9.32

Source: Appendix Tables 5 and 6

Table II

Provincial Government Revenue Expenditure and Surplus or Deficit
on a National Account Basis
1968-1977

	Ontario				Alberta			
			Compound Growth Rates				Compound Growth Rates	
	1968	1977	68/77	73/77	1968	1977	68/77	73/77
Total Revenue	3557	11671	14.11	14.10	711	5059	24.35	31.63
Total Expenditure	3322	12501	15.86	16.31	791	3440	17.74	21.78
Savings (deficit)	235	-830	--	--	(-80)	1619	--	--
Capital Consumption Allowance	89	329	15.64	20.51	35	130	15.70	21.84
Gross Capital Formation	248	601	10.34	7.80	81	306	15.91	20.53
Surplus (deficit)	76	(-1102)	--	--	(-126)	1443	--	153.40

Source: Appendix Tables 2 and 3

				Compound Growth Rates	
	1968	1973	1978	1968/78	1973/78
Ontario	54.9	63.0	117.0	7.86	13.2
Alberta	230.4	351.9	3,658.7	31.85	59.7

From 1973 through 1978 the Ontario "take" was $0.7 billion the Alberta "take" was $10 billion Comparable but incomparable!*

The sources and (uses) of funds of the two Provinces from 1968 through 1977 are shown in Appendix Table 11 and 12. It can be seen that Ontario has been a net borrower year after year - nearly $1 billion in 1977. Since 1973 Alberta has been a net lender - nearly $1 billion in 1977. From 1973 through 1977 the Government of Ontario increased its indebtedness by $3.7 billion: the Province of Alberta acquired assets (or reduce its liabilities)to the tune of $2.7 billion.

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* In the 1979 Alberta Budget (Table III(A)) these data (in millions of dollars) are presented for non-renewable resource revenues:

	Budgetary	Non-Budgetary	Total
1977-78 (actual)	2.1	0.9	3.0
1978-79 (forecast)	2.4	1.0	3.4
1979-80 (estimate)	2.8	1.2	4.0

If we aggregate the Alberta Governments' grants to its municipalities of about $1 billion (to allow them to eliminate their debt) and the Province's contribution to the Heritage Fund (See Appendix Table 16) of about $1.5 billion, the Government of Alberta anticipates a surplus of about $2.5 billion in fiscal 1979-80. The Provincial Treasurer of Alberta is not noted for undue optimism in these matters.

The most recent Ontario budget estimates a continuation of the deficit at roughly the same level as in the recent past despite heroic, and politically painful, efforts to impose expenditure stringency.

The position of the Alberta resident is actually materially better than the rather extraordinary differences previously described would suggest. Ontario is by no means a high tax province as compared with, say, Quebec. However, from a taxpayer point of view the Ontario taxpayer is being ground into the ground as compared with the Alberta taxpayer. Using comparable data for 1976-77 (compiled for the calculation of federal equalization payments) the effective tax rates of Ontario and Alberta can be readily calculated. These were as follows:

	Ontario	Alberta
Personal income tax	0.3179	0.2772
Corporate income tax	0.1325*	0.1843*
Sales tax	0.709	0.0020
Motive fuel tax/gal	0.000199	0.000115
Alcoholic beverages	0.0170	0.0195
Other (excluding resources and real property)	0.0071	0.026

These differences in effective rates superficially do not appear large. When applied to their respective bases this impression is dispelled. Consider the following results for 1976-77 (billions of dollars):

	Ontario	Alberta
Actual revenue	6.52	1.16
Hypothetic revenue had the effective rates of the other province been in effect	4.24	1.81
Absolute difference	-2.27	+0.65
% Difference	-34.9	+55.8

* The difference between the two effective corporate rates can be explained by Ontario's concessionary rates for small business. Alberta has since more then followed suit.

Had Alberta tax rates prevailed in Ontario, Ontario tax collections would have fallen by nearly 36 per cent. Had Ontario rates been imposed in Alberta, tax collections would have risen by about 56 per cent. These estimates do take into account neither natural resource revenues nor differences in real property taxes. The Alberta Treasurer acknowledged in his 1979 Budget that "Homeowners in Alberta continue to pay property taxes that were among the lowest in Canada." Despite this fact he then announced that the Provincial Government would make grants to the municipalities to enable them to discharge their debts. The grants will total, as previously stated, about $1 billion.

If we make the rough and ready assumption that Alberta government revenues (aside from natural resources) would be about 56 per cent higher with the effective tax rates of Ontario, the estimated total tax revenues in that Province (aside from resource revenues) for 1979-80 would not be $1.2 billion in 1979, as the Budget states, but $1.9 billion. To the "surplus" of about $2.5 billion, discussed above, about $0.7 billion should be added.

There is no mystery as to the principle source of the Alberta taxpayer's "savings". Alberta does not levy a retail sales tax. Ontario collects well over $2 billion a year from this tax.

These kinds of numbers do not "prove" anything about the rights or wrongs of the situation. But, to employ the same word in another sense, they may well "prove" sufficient to arouse the voters of Ontario. Here we have Ontario voter's paying taxes that are at least 35 per cent higher than

Alberta voters with public services that are no better and probably worse. Yet the government of Alberta is running increasing and extremely large surpluses while Ontario is running persistent deficits. Alberta residents are accumulating a legacy of wealth for themselves - a legacy that is growing by about $1.5 billion that somehow estimated will to reach about $25 billion by 1985.

Ontario residents are accumulating a legacy of an ever growing debt that future residents will have to service through higher taxes.

And all of this <u>before</u> the price of crude oil in Canada rises by about another $10 per barrel! Ontario voters can hardly ignore the fact that about $4.50 cents of this will accrue to the Government of Alberta according to the estimates of the Federal Government's EMR estimates. In essence, the standard of living of the average Ontario resident, who has an income that is now about the same as the income of the average Alberta resident, and who already pays much higher taxes, is now being asked to pay, through higher gasoline, fuel and other prices, a substantially higher "tax" to the government of Alberta. The perverse in-flationary and short-term unemployment effects would hardly be ignored either should the Ontario voter (or his political spokesman) wish to put together a rationale for resisting higher oil prices.

With a progressive income tax and higher per capita incomes on a per capital basis, the average resident of Ontario has, over the decades, borne a disproportionate share of the costs of:

- two World Wars
- equalization payments to "have not" provinces

- the federal half of shared cost programs
- massive corporate tax subsidies to the petroleum industry
- natural gas price subsidies

And the list could be extended ad infinitum and ad naseum.

Whatever the merits of these "facts" from the point of view of economic analysis, they provide powerful ammunition for the cannons of Ontario politicians.

The prevailing political situation cannot be ignored in considering the Canadian energy issue. The Clark minority Federal Government is newly elected, inexperienced, and much dependent upon the electoral support of the western provinces <u>and</u> Ontario. The Davis minority government of Ontario seems to maintain some kind of precarious low level equilibrium - an equilibrium that could quickly be upset by an apparent willingness to accept uncompensated higher energy prices. The Lougheed supermajority government of Alberta is in as strong a bargaining position as attainable. And there is, of course, Levesque's Quebec government preoccupied by the impending referendum and certainly not anxious to bolster any federal initiatives that would increase its credibility with the Quebec electorate.

This would suggest that the Clark government can afford to alienate western voters only if it can offset the losses there by additional support elsewhere, particularly in Quebec. The Davis government must support low energy prices <u>unless some perceived quid pro quo for the Ontario voter</u> is secured. The Lougheed government can be completely intransigent in the pursuit of the narrow interest of Albertans and the Alberta treasury.

Summary of Part A

We have tried in this Part to present a conceptual framework that assists in understanding the underlying purpose of a federal form of government in order to bring to the reader's attention the more important constitutional and attitudinal factors that impinge on the political dimension of the Canadian energy issue. The principle points we have sought to convey are these:

1. The physicial presence of marketable natural resources within the territory over which a national government has jurisdiction does not ensure that the residents are thereby better off. Unless the resources are sold to non-residents at fair market value and/or through the imposition of "optimal" tax rates on the Canadian source income of non-residents, Canadians would be as well off if the resource did not exist or preferably were not exploited. Similarily, but somehow less disturbing, is the possibility that the bulk of the benefits of the collective resource are captured by a few resident individuals. This is primarily a question of equity. Even when the collective benefits derived from collective assets are maximized, the question of the "proper" distribution of those benefits arises in a virulent form, particularily when the resources are concentrated in one geographic area. And when the resource is "owned" by a constituent part of a federation with jurisdiction in that area an especially virulent form of the greed-envy disease can threaten the life of the national body politics.

2. Under certain conditions a federation potentially can result in some of the individuals resident in the con stituent parts being better off and none worse off. Efficiency gains can be obtained while minimizing coercion

of geographically clustered minorities. However, the qualification "potentially" is of great significance. Although the competition among national political parties tends to result in log rolling compensation for regional minorities, persistent majority coercion of geographic minorities can occur, as can the converse, when the minority has some form of monopoly power, as does Alberta at the present time. Should the coercion take place in either form, and should the federation not collapse as a result, in the long run the movment of residents "voting with their feet" will restore a rough but inexorable kind of equilibrium.

3. Perhaps not surprisingly the provisions of the Canadian constitution are such that a stalemate has been reached with respect to the distribution of the collective benefits of petroleum resources: The federal and the provincial governments can offset the policy initiatives of the other. There is a wide range of possible strategies extending from blatant coercion of one party by the other to the capitulation of one or the other of the parties before the fight begins. Voter perceptions of the legitimacy of the means is all important in arriving at a resolution of the conflicting interest.

4. Whether it be escalation to coercian or capitulation,(or somewhere in between) depends crucially on voter perceptions not only about their constitutional rights but of their "rights in equity", so to speak. Politicians-federal and provincial - must, for their survival at the polls, <u>appear</u> to have pursued the interests of their respective constituents however shortsighted, self seeking and self righteous they may be.

In the tug of war between the Provinces (residents!) of Alberta and Ontario - the biggest oil producer and the

biggest pretroleum consumer - there is a large divergence between the perceptions of the voters resident in each province: differences in how they see themselves and how they see each other. The declining relative economic position of Ontario and the all too obvious affluence of Alberta means that it would be politically suicidal for politicians in Ontario to appear to accede to a further deteriation in the economic position of Ontario voters to the benefit of cash burdened Albertans.

The number of Ontario seats in Parliament relative to the number of Alberta seats dictates that the perceptions of Ontario voters be, to put the matter as mild as possible, treated as consequential.

We have emphasized in this Part the political realities that impinge in the resolution of the energy issue. These political realities consist of voter perception about their legal rights and their "rightful place." They also include voter perception about the impact of alternative policies on their self interest. In the next Part we put aside the questions of voter perceptions, and address an entirely difficult kind of question.

Suppose that Canadians sought to maximize their aggregate real income while maintaining roughly the same interpersonal distribution of income. Given the dramatic increase in world oil prices, how would the policies that would be optimal for a unitary state have to be modified to take into account the Canadian "federal fact."?

It is important to note that implicitly the maintenance of "approximately the same interpersonal distribution of income" means "approximately the current interregional distribution of income" because, in the short and medium runs individuals are where they are.

Part B: THE MODIFICATION OF OPTIMAL ECONOMIC POLICIES UNDER CANADIAN FEDERALISM

In order to isolate the federal-provincial dimension of the energy policy issue we will first assume that Canada is a unitary state. Second, we will postulate a set of policies that would, (a) maximize allocative efficiency; (b) maximize the collective benefit from non-renewable energy resources located in Canada. In the following Part the distribution of this benefit among all Canadian residents is considered. Using this set of hypothesized policies as a kind of benchmark we then, on a policy by policy basis, consider the kinds of modifications that might be involved when the Canadian constitutional reality is taken into account. In examining the possible modifications required we will suppose that Alberta is the only provincial government possessing oil and gas resources and that the Government of that province seeks to maximize the share of the collective benefit accruing to the current residents of the province and their programs. Crudely put, we are setting up a hypothetical kind of policy game with the Federal Government trying to garner all the windfall gains for distribution to all Canadians while the Government of Alberta is trying to garner all of the gains for the residents of the province.

In this Part political realities are, with a few exceptions, ignored. We use the term "proposed policy" in a most restricted sense. The reader should constantly be mindful of the rather extraordinary assumptions that, in a sense, dictate the resulting proposals. In the concluding Part of the paper our "real" proposals are advanced.

Our final preliminary word. Roughly speaking the world price of oil has moved from \$4 to \$14 to \$24 per barrel currently. As is well known, the Canadian price ceiling of about \$14/barrel means that there has already been a wind-

fall gain of $10 per barrel. Similar gains have already occurred, with respect to natural gas. The effects on the revenues of Province of Alberta have been described. In this Part we are <u>not</u> considering a return to the 1973 situation in 1973. Rather we are considering the <u>next</u> $10/barrel increase in the domestic price of crude oil. In other words, half of the windfall gains to date have already been captured. We are not contemplating their recapture - only the question of "where do we go from here"?

Section 4 The Future Supply and Demand for Energy in Canada

In recent years, there has been an unfortunate return to the Malthusian fascination with the apocolyptic consequences of the inevitable collision of projected future demand and supply trends growing at different rates. As with the interpreters of the first primitive version of the Malthusian population theory, those addicted to extrapolation are too quick to revel in despair or call for extraordinary measures: they are too slow to analyze the processes of adjustment that are likely to emerge, or could be induced to emerge, that will or would preclude the dire consequences that are implicit in their assumptions. This general comment seems to be true, unfortunately, with respect to the so-called energy crises.

Of particular importance has been the highly questionable quality of the Canadian estimates of the demand for energy and of the stocks of conventional oil and natural gas. As John Helliwell convincingly argues, the demand forecasts have been, with few exceptions, too high and the stock estimates too low. The overestimate of the growth of the Canadian economy and the underestimate of the price elasticity of the demand for energy largely have accounted for the former. Underestimation of the degree of substition between different energy sources, and in particular between oil and natural gas consumption in response to changes in their relative prices (the cross elasticities of demand), has also been a factor. The failure to reflect adequately the crucial role of price in determining the recoverability of gas and oil from known deposits largely has accounted for the latter. In short, by grossly understating the adjustments on both the demand and supply sides that would be brought about by rising energy prices, it has been all too easy to conclude that dire shortages and/or an inordinate reliance on insecure foreign imports are inevitable unless extraordinary steps are taken to augment supply.

The fact of the matter is that the price elasticities of demand and supply have either been ignored or based on a narrow range of data that provides little information about the effects of large and permanent relative price changes. This being the case, we should recognize our ignorance about the future changes in demand and in supply that would occur if consumers and producers were faced with dramatically higher oil prices. By allowing the prices of oil to rise, and the price of natural gas to fall relatively, as is proposed in the next Section, we will be able, over the next five to ten years, to make much better informed and hence more rational decisions concerning the need for unconvent-ional oil and/or high cost frontier oil and gas.

From a strictly economic efficiency point of view, the goal of energy self-sufficiency makes little if any sense. The wellbeing of the Canadian economy, and hence of the average Canadian, is determined by the economic wellbeing of our trading partners and, in particular, the United States. If Canada were self-sufficient in energy by, say, 1995, but our energy was, for some reason, extraordinarily costly relative to the energy costs of other trading nations, the Canadian standard of living would be lower because the Canadian dollar would have to be lower. We would have to export more in exchange for a given level of imports.

To argue against the goal of energy self sufficiency is not to argue against the provision of some excess capacity to lessen the shock of an interruption of foreign supply. With some contingency stocks and production capacity an orderly adjustment is possible. Increasing out ability to cope with stocks is one thing: trying to make Canada impervious to any and all external shocks for a period of indefinite length is quite another.

The manipulation of international oil flows is now a strategic weapon in the ceaseless struggle among nations in the pursuit of the interests of their citizens, if need be at the expense of others. However, as in international matter generally, Canada is ultimately dependent upon the economic and military strength of the United States.

Whatever the additional costs Canadians bear in an attempt to achieve energy self-sufficiency, and they will be extremely high, we cannot isolate ourselves from an energy crisis that brought the American economy to a standstill. If the American economy were to be sick unto death the Canadian economy would be dreadfully ill. If the American economy went down hill the American defence capacity would falter. If that capability faltered, Canada would be hopelessly vulnerable and the more ripe for the picking if we had abundant energy - albeit energy abundance obtained at great cost. And there can be no doubt that the cost of the pursuit of energy self-sufficiency would be extraordinarily great in terms of other opportunities foregone.

This emphasis on Canada's dependence both economically and military, on the United States should not be construed as an argument for a continental energy policy. Canada has an energy advantage. We should neither give it away nor fritter it away . It is my concern that, in the pursuit of the will-of-the-wisp of energy self sufficiency, Canada will fail to use its initial advantage to advantage. Generations of Canadians have, for over a century, paid a significant price in order to be different from their southern neighbours. I, for one, believe that the opportunity to be different is worth something. However, there is no virtue in paying a higher price than is necessary. To put the same point in a slightly different way, if Canadians use their advantage to advantage they will be wealthier. And to paraphrase the late Harry Johnson, there is nothing like more wealth to make one more independent!

The political attractiveness of an energy self sufficiency policy for Canada is obvious. It appeals to the voter's anticipation of the smug delight he will feel in being able to say to those in trouble "I'm alright Jack". While such feelings may be somewhat shoddy, if painfully human, they cannot be bought at the price of shoddy. Moreover, from the point of view of a politician searching for votes, the self-sufficiency goal exudes an aura of clear national purpose and a "take charge" attitude as Canadians are led into the war against line ups at the gasoline-pumps -- lineups that would disappear if higher prices were allowed to fulfill their rationing function. The thought of an empty fuel tank in the basement when the temperature outside is so low as make the packed snow on the sidewalk crack when one walks is petrifying. On the other side of the coin the contemplation of mammoth synthetic oil producing or heavy oil processing structures and equipment rising like steel pyramids in the Canadian wilderness give us a delightful feeling of self satisfaction. These steel and concrete monsters would symbolize what we would like to think of ourselves: standing strong and resolute in the wilderness in defiance of the elements.

There is, of course, nothing wrong with symbols and, indeed, they undoubtedly serve as a glue that helps to bind nations together when battles over other, perhaps more tangible, interests are threatening to pull them apart. Nevertheless, it is doubtful that most of those who endorse the energy self-sufficiency goal are aware of the costs that Canadians collectively will have to bear should it be pursued. Nor have they thought through its inherent futility as a means of protecting the nation for all time against external energy viscisitudes. Moreover, while the mindless pursuit of the energy self-suffiency goal is unlikely in the end to provide collective benefits commenserate with the collective costs, as is almost invariably the case, it will certainly provide large and unequivocal benefits to the few.

About one hundred years ago a few eastern industrialists (e.g. Massey and Gooderham) made fortunes by dint of Sir John A Macdonald's so-called "national policy". Foreign investors, notably became enriched (to an even greater extent) became notably enriched by capturing (through the precursors of such corporations as CIP, Reed, INCO and so forth) the public domain (especially timber and mineral rights) in eastern Canada for their private benefit. Under the energy self-sufficiency banner we now seem on the verge of granting the supranatural petroleum corporations, that have already done more than nicely with Canadian conventional oil and natural gas, another fistful of Canadian assets in exchange for a false sense of independence and some industrial monuments.

The ultimate futility of striving for Canadian energy self-sufficiency, unless the United States either follows suit or obtains security of supply in some other way, is not affected by the Canadian federal system. Nevertheless, under the current synthetic oil and heavy oil upgrading proposals all Canadians would bear the extra costs of such a policy in the form of higher prices and in massive federal tax expenditures (taxes foregone). All Canadians are unlikely however to share in the "benefits". The producing provinces are certain to collect royalties. The Canadian assets held by non-residents are likely to increase. The federal treasury may, to all intents and purposes, never collect any tax on behalf of Canadian residents generally.*

Energy self-sufficiency is, of course, the perfect policy from the point of view of producers. Concessions are offered with abandon without any careful appraisal of their effectiveness, as will be discussed later. A needlessly large

* The Ontario Treasury also suffers because the major refineries are located in Ontario and their corporate income is reduced by the deduction of expenses incurred in the non-conventional oil projects.

part of the collective benefit is captured by the industry - an industry that is, we wish to stress once again, overwhelmingly owned and controlled by the few supranational oil companies.

The petroleum industry throughout the world is dominated by a relatively small number of extraordinarily large supranational corporations. The fact that none of these corporations is Canadian controlled is not of great moment, for it is doubtful that their decisions reflect much concern with maximizing the interest of any particular nation. Rather they might better be thought of as maximizing their respective corporate interests, individually and severally, on a long-term world-wide basis. Of particular importance in the present context is the power these corporations possess to shift petroleum exploration and development activities around the world in a highly strategic manner. That is to say, the corporations do not take national tax regimes as given. They can withhold or withdraw exploration and development investment from a particular nation that has petroleum potential in order to induce the nation to adopt a favourable tax regime from their point of view. This strategic power, that is in effect the power to blackmail and coerce national governments, arises to a large extent from an ability of the corporation to divert large flows of funds internationally and quickly to put together (or take apart!) investment projects of great size. But it also arises because they have a virtual monopoly of the best technical information and skills related to all aspects of petroleum exploration, development and marketing. This certainly includes geological, geophysical and petroleum engineering knowledge and expertise. It also encompasses the legal, accounting, economic analysis and public relations fields on a nation by nation basis. One might well argue that co-opting the latter is more important than monopolizing the former.

The international petroleum companies are able to deploy their tactical advantages and their monopoly of knowledge and expertise through well orchestrated and well financed pressure group activities. These activities are made more effective by encouraging the existence of relatively small, ostensibly independent, corporations controlled by nationals. The policy demands of the latter are likely to generate automatic support from the national business community. Moreover, they create the illusion that what is in the interest of the Canadian independents must also be in the national interest. This tends to mask the fact that what is in the interest of the domestically controlled independents is almost invariably also in the interest of the large international corporations -interests that are overwhelmingly greater in magnitude. The interests of the latter often are not in the national collective interest.

Anyone who doubts the effectiveness of the petroleum lobby is advised to read Meyer Bucovetsky's article[1] dealing with the mining lobby's behaviour with respect to the Carter Commission's recommendations concerning mining tax reform. Can anyone doubt that what the mining lobby can do the petroleum lobby can do better? The group of integrated petroleum corporations being smaller, the "free rider" problem that reduces the effectiveness of most special interest groups is, to all intents and purposes, negligible with respect to the petroleum lobby.

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Meyer Bucovetsky:

Section 5: PRICING TO INDUCE CONSERVATION AND SUBSTITUTION

Few economists would disagree with the proposition that when there are many buyers of a particular good or service that has many uses, an increase in its relative price is the most efficient means of inducing a reduction in the amount taken, in part resulting from the substitution of other cheaper goods and services for it. The world price of crude oil began to rise sharply after 1973 as a result of OPEC carterlization that perhaps reflected an increased awareness by the oil exporters of the fact that their known conventional oil reserves were being rapidly depleted at a low price that restricted the economic recovery rate. Whether contrived or not, for Canada as for so many other nations, the world supply of crude oil has become increasingly scarce relative to the demand for it. Alternative sources of energy, therefore, have become more valuable. Artificially depressing energy prices in Canada by about $10 per barrel below the world price of approximately $24 per barrel through an oil export tax and an oil import subsidy undoubtedly means that more is consumed in Canada than would be consumed if the world price prevailed here.

We are importing more oil than we would if world oil prices prevailed in Canada. Leaving aside foreign borrowing, these imports depress the value of the Canadian dollar. This means we have to export more goods and services that we could otherwise either consume ourselves and/or import less. We "pay" in lost satisfaction from these extra imports or reduced imports more than we gain through subsidized oil consumption.*

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* Helliwell, John F., Annual Review Energy, 1979; IV, Page 175-225.

There is no doubt that, in the short term, the quantity of oil taken is insensitive to changes in its price (the price elasticity of the demand is close to zero) because the degree of substitution is extremely low. The capital costs of switching from the use of one source of energy to another are high, as are the immediate costs of substituting, say, mass transit for the private automobile. The location of residences and work places relative to each other are also costly and time consuming to alter. Nevertheless, it is equally obvious that, in the longrun, a substantial degree of conservation and substitution (e.g., home insulation) would take place were the price of oil to rise and was expected to remain relatively high.

Any rationing by fiat (coupon) scheme would be much less efficient, in part because of the administrative costs involved and in part because administrative allocation presumes a degree of detailed foreknowledge of changing demands that simply does not exist. Localized surpluses and shortages are endemic under such rationing systems. Sporadic shortages mean lost production, and hence waste, not to mention frustration.

It follows, therefore, that to induce the more efficient use of scarce oil the price of crude oil in Canada should move quickly to the world level. At that level there would be no need to regulate oil exports to the United States where the price of crude oil is expected to remain below the world price at least until 1981 except to ensure that Americans do not substitute secure Canadian imports for other offshore imports, thus increasing Canada's reliance on the latter.* Because it seems virtually certain that the world oil price will not fall in real terms, and may well continue to rise,

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* In any event, the rapid phase out of Canadian net oil export seems eminently sensible and should be explored if the price differential did not have the effect presumed here.

Canadian investors should be assured that oil price ceilings below the world price will not be reestablished in the future in Canada. This added certainty with respect to future Canadian policy would lead investors to seek ways to minimize the impact of persistently higher priced oil. This would tend to encourage the capital investment required to substitute other energy sources for oil.

Canadian annual domestic crude oil consumption is now about 700 million barrels. At a Canadian-world price differential of $10 per barrel the total subsidy to Canadian consumers is obviously about $7 billion. The Department of Energy, Mines and Resources estimates* that a one dollar increase in the Canadian price results in a revenue change that is distributed approximately as follows: producers 45 percent; Alberta 45 percent and the Federal Government 10 per cent. Ignoring oil imports for the moment the <u>annual</u> "contributions" to the current consumer subsidy are therefore: producers <u>$3.2</u> billion, Province of Alberta <u>$3.2</u>, Federal Government <u>$0.7</u>. These might be thought of as the current rents forgone. Under a unitary state moving to the world price would mean that, as consumers, Canadians would lose a subsidy in 1978-79 of about $7.0 billion, but as "co-owner" of the federal purse they would in a sense gain roughly $3.9 billion. This is not the end of the story, however. On an out-of-pocket basis, the situation is rather different. Leaving aside equalization payments, the net cost of the price ceiling for 1980 to the Federal Government is estimated* as follows:

	Mill. $
cost of oil import subsidy	1.597
proceeds oil export tax	(651)
proceeds gasoline excise tax	(434)
	512

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* EMR letter and attachments 18th July 1979

Assuming that the oil export tax become ineffective the gasoline excise tax were abolished, the purse of the unitary state would be increased by the $3.9 billion cited above plus this net savings of $0.5 billion for a total of $4.4 billion. The disposition of these additional government funds is considered later.

One simple but frequently forgotten point needs to be made. Although it is a convenient abstraction to speak of an allocation of the rents among producers, governments (provincial and federal) and consumers, all rents ultimately are captured by individuals. Investors (through higher share prices or dividends), employees (through higher wages) and suppliers to the industry (through higher prices) capture the producers share of the rents. Provincial residents and Canadian residents capture (through lower taxes, improved government services or transfer payments) the government share of the rents. Individual consumers capture the rents through prices that are below market for oil and its derivatives. Corporations and governments are, of course, forms of organization. Such abstractions <u>cannot</u> benefit from the rents just as they cannot suffer from a tax - a matter to be discussed shortly.

<u>Natural Gas</u> : There are, in essence, two regulated prices for natural gas in Canada : the Toronto gate price and the export price. The former price is equal to about 85 per cent of the domestic price of crude oil in BTU equivalent terms and the latter price is significantly above the former. On efficiency grounds, it is tempting to propose that the price of natural gas, both for domestic and foreign consumption, be the same as the world price of crude oil in BTU equivalent terms. This is another temptation that should be resisted. <u>Equivalence in terms of BTU's does not necessarily mean equivalence in substitution given existing technologies</u>. A BTU embodied in a gallon of gasoline is <u>not</u> equivalent in use to a BTU embodied in coal. Only if the relative prices

of oil and gas are permitted to change in response to market forces will we know their economic equivalence in use. (We do not expect foods to sell at calorie equivalent prices!) This would seem to suggest that to induce greater substitution if the price of crude oil in Canada were allowed to rise to the world level the price of Canadian natural gas for domestic consumption should be allowed to finds its own "competitive" level. That is the proposal advanced here on efficiency grounds.

Natural gas distributors are, of course, natural monopolies. It would be important to ensure that through rate regulation the corporations that distribute natural gas were not able to capture monopoly profits by restricting volumes in order to raise natural gas prices. It is proposed on effiency grounds that natural gas pipeline operators be required to function solely as common carriers and be regulated on a rate of return basis. It would then be possible for bulk purchasers of natural gas to enter into contracts directly with the producers. Gas distribution corporations would continue to be regulated on a rate of return basis like the pipeline operators.

But what of natural gas exports? Clearly, if neither export volumes nor the domestic price were regulated natural gas would not sell in Canada below the price at which it could be sold in the United States. And the U.S. price is established by regulation as the BTU equivalent of the world crude oil price. Given that Canadian producers have excess reserves at the present time, the complete deregulation of Canadian natural gas prices and volumes might well result in rapidly rising Canadian gas exports priced somewhat below the US domestic gas price. The same price would almost certainly, prevail in Canada. The result would be that Canadian gas would be "given away" in the US and the price of Canadian gas in Canada would be almost as high as

it would be had the Canadian gas price been fixed at the world crude oil BTU equivalent price. Canadian natural gas producer's would enjoy a large windfall assuming royalties were not increased.

The straightforward route out of this impasse would be to levy a flexible natural gas export tax that had the result of ensuring that Canadian natural gas sold in the US at a price somewhat above the US price at all times - a premium that can be justified in security of US supply terms. No control over the volume of Canadian gas exports then would be re-quired. (It should be recalled that complete self suf-ficiency has been rejected as an unattainable goal.)

A floating domestic price for natural gas and a gas export tax that more than made up the difference between the Canadian and U.S. prices would, in the absence of gas royalty increases (a matter to be discussed later), deprive the Canadian producers of most of the windfall gains they otherwise would obtain by virtue of the higher world crude oil price. More important, it would allow the Canadian price of natural gas to fall relative to the price of crude oil priced in Canada at its world level. This would encourage the substitution of gas for oil.

In the long-run, there is no justification, on efficiency grounds, for selling natural gas in Canada at a price below the unregulated U.S. market price. Subsidized domestic gas prices would be a most inefficient method of improving the international competitive position of Canadian industry. Unless there were firm evidence to support the contention that gas producers in both countries had an inordinately high discount rate, or persistently underestimate future prices, there is no economic sense in hoarding gas for some future period. If they can yield more than the real interest rate, capital goods that are imported now in

exchange for natural gas exports are more valuable than more domestic gas sometime in the future.

The Oil Trading Agency Proposal : One of the barriers to implementing the pricing scheme just described is the cartel-like nature of Canadian oil production and refining that is completely dominated by a few supranational giants and the natural monopoly characteristics both of oil and gas pipelines and local gas distribution systems in both Canada and the United States. Furthermore, the terms and availability of our oil imports are ultimately determined by foreign governments. Workable competition does not prevail in vital parts of the oil and gas industry. Nor is there reason to believe that unilateral action by the Government of Canada could bring it about. Under our unitary state assumption one way of minimizing the impact of the lack of competition would be to create a national oil and gas trading agency that would, in effect, act as the monopoly buyer and seller of crude oil. The trading agency would negotiate all long-term crude oil purchase contracts with the agencies of foreign governments and purchase all domestic crude oil by tender . It would sell all crude in Canada at the world price. Collusive attempts to withhold domestic oil and gas supplies could be thwarted by ensuring that competitive bids were submitted by a government oil production agency (e.g. Petro-Canada). By purchasing all western crude oil by tender and by selling it at the price of offshore crude, plus or minus the difference is transportation costs, all of the rent element rising from increasing prices would be captured from producers by the state trading agency.*

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* The national trading agency would function in some respects like the British Columbia Petroleum Corporation except that the proposed trading agency would purchase domestic oil and gas by tender and not offer to purchase them at a fixed price.

Without a dynamic econometric model it would be futile to try and estimate the long term annual gross profit of the oil trading agency. Even with such a model only estimates based on alternative world price assumptions would be possible. About all that is clear is that, in the short term, the "profit" from oil would be approximately equal to the prevailing annual gross subsidy of about $7 billion (700 million barrel time $10) less the net cost of the subsidy of about $0.5 billion set forth earlier.

There is no doubt that, in principle, the proposed oil trading agency could be established in a unitary state. Assuming this means of capturing the petroleum rents were optimal, what are the barriers to the implementation of the proposal in Canada? Because Alberta claims all the rents, the national trading agency proposal would, to say the least, cause screams of outrage from that province, and possibly British Columbia and Saskatchewan. The Constitution would not seem to constitute an impediment if the agency were to exclude from its ambit oil and gas produced <u>and consumed</u> within a province. Federal jurisdiction over oil exported from a province and foreign oil imports seems absolutely clear.

The producing provinces could retaliate in three ways however. First, they could restrict output thereby necessitating larger foreign imports. The collection of the rents would be postponed and the profits of the national trading agency deferred! The second strategem, that is already being employed to some extent, would be for the producing provinces to agree to "sell" for next to nothing oil and gas to petro-chemical and other potential industrial energy users located in the province. This would make firms heavily dependent upon oil or gas non-viable if located outside the province unless a federal subsidy were provided that offset the higher national price. As indicated before,

the subsidization of Canadian industry by means of energy subsidies is most inefficient.

Another, and probably the simplest, strategem the producing provinces could adopt would be to raise oil royalties by about the difference between the prevailing price and the world price. The non-deductibility of provincial royalties for federal corporate tax purposes would mean that the federal corporate tax take would not suffer from such a change in royalties. Nevertheless, to the extent that higher oil royalties were passed on in higher prices at which oil was tendered to the trading agency, which almost certainly would happen to some degree, the main purpose of the national oil trading agency would not be served. Taken together the stategems available to producing provinces that sought to frustrate its purpose mean that a national trading agency must be ruled out.

There would seem to be two alternatives: The first is a 100 per cent tax on windfall oil and gas profits; the second is an excise tax on crude oil or products derived from crude oil. (We ignore this variant here)*. The windfall tax is

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* There is a temptation to adopt differential prices for oil derivative products in metigate hardships (e.g. lower prices for home heating oil). This is much less equitable and efficient than the approaches discussed later to meet the hardship problem.

ruled out on administrative grounds. It is virtually impossible to determine operationally the "extra" profit of a large, integrated oil company arising from unanticipated price increases because they produce indistinguishable "new" and "old" oil. A modified excise tax (the proposed modification is decribed presently) on domestic crude oil equal to the difference between the current wellhead price and the landed price of foreign crude would be infinitely more straightforward to administer. Such an excise tax would not preclude the provinces from reducing output. It would, however, place a lower bound on the energy subsidy provided to provincially located industries. It would be proof against attempts by provincial government to capture the rent through higher royalties. It would be proof against provincial "nationalization"of the oil industry.

Should the reader have forgotten, an excise tax of about $10 per barrel would not affect appreciably the present growth of the Heritage Fund. Ignoring the effect of our natural gas proposals on provincial revenues the excise tax would, however, hold the growth of the Fund to what it would have been if the world oil price were to be fixed at about $13 barrel, which is roughly $10 per barrel more than it was when most of the exploration development of the current resources took place.

If the oil import subsidy were removed and the domestic crude oil price deregulated there can be no doubt that the price of domestic crude oil in Canada would quickly rise to the world level (adjusted for transportation costs). The domestic oil producers would, in effect, tax the Canadian consumer an additional $10 per barrel. By imposing a federal excise tax all of the proceeds would accrue to the federal treasury rather than 10 percent - the balance being split evenly between the producers and the provinces. The incidence of the federal excise tax would, of course, be the

same as the implicit tax resulting from the move to world prices. Some oil purchasers would pass the tax forward in the form of higher prices for the goods and services they sell or backward in lower prices for other goods and services they buy. Some of the burden would be shifted to non-residents: part would be borne by Canadians.

Generally speaking, if the price of oil rose sharply as a result of the tax, unless the money supply were increased the prices of other things would have to fall absolutely or more unemployment would result. For reasons that need not delay us here, prices are inflexible downward, at least in the short and medium term. To avoid the additional unemployment we could expect that the money supply would be increased and the general level of prices rise more rapidly. If the Canadian inflation rate were no greater than the U.S. inflation rate and the world price of oil did not rise further in U.S. dollars (probably an unrealistic assumption), the price of Canadian oil including the tax would decline in real terms with domestic inflation. However, this is a stabilization policy issue that falls outside our terms of reference.

Although the wellhead excise tax is by far the simplest method of collecting the $10/barrel rent that would be generated by moving to the world oil price, unless modified the tax would create a signficant problem. Bygones being bygones as far as investment is concerned, the imposition of the tax would not affect the conventional extraction of conventional oil from know pools. If it pays the producer to extract a barrel of oil at $14/barrel it will pay him to do so if the after excise tax price is still $14/barrel. As far as the future rate of investment in exploration and development is concerned, the excise tax would be capitalized in the prices bid for land - the expected after tax date of return would be unchanged. The investment rate

would therefore not be significantly affected. What would be affected, and this is cause for serious concern, is the extra investment and operating costs involved in secondary and tertiary recovery from known pools. Fourteen dollar oil will warrant the additional expenditure of up to $14/barrel to recover it from the pool. Obviously $24/barrel oil will warrent additional expenses to recover additional oil from the pool. This is of the greatest importance because when crude oil is cheap it only pays to recover a relatively small proportion of the known pool, and conversely.

To circumvent this serious difficulty it is proposed that there be a <u>tiered</u> excise tax schedule established. The $10 levy would apply across the board but with these vital exceptions: operators extracting oil from a <u>particular</u> pool would be eligible for a reduction of say 50 percent in the excise tax on the crude oil produced from the pool if they could establish that: secondary extraction methods were being applied to that pool; the reserves recoverable by primary extraction had, in fact, been extracted. Furthermore, if they could establish that tertiary extraction methods were being applied to the pool and that the additional reserves recoverable by secondary extraction had indeed been extracted, the excise tax would be waived altogether on this third tier oil.

While I claim no expertise in the matter, it is my understanding that pool by pool differentiation is not impractical and that it would not be impossible to arrive at some <u>reasonable</u> straightforward criteria for the determination of the use of secondary and tertiary recovery methods. If this is the case, the scheme proposed, although no doubt rough and ready, would seem to me to be infinitely better than an attempt to tax windfall profits and much better than an undifferentiated excise tax rate. The <u>additional</u> conventional oil recovered from known pools at

the world price with zero excise tax will be <u>much</u> cheaper than unconventional oil. The supply response to higher prices through secondary and tertiary recovery could dramatically change the Canadian conventional oil supply picture.

As already stated, in our view, the price of domestic natural gas should be deregulated in the expectation that, at least for five or ten years, its price would fall (at least relatively) below the 85 per cent BTU equivalent world price of oil that now prevails. It would be counterproductive, therefore, to impose a comparable excise tax on natural gas destined for the domestic market. The purpose we seek to serve through the deregulation of domestic gas prices would be frustrated, however, if the provincial gas royalty were raised. To preclude the gas royalty price hike the Federal Government could provide for a punitive gas export tax: increases in royalties would trigger a confiscatory increase in the gas export tax. This would so damaging to the producers that the provinces would be bold indeed to increase their gas royalties. It would be <u>infinitely</u> better however, if by a sharing of the proceeds of the gas export tax with the province the need for such a punitive provision were avoided. This sharing arrangement is discussed in the next Part.

Circumscribing the role of pipeline companies to that of common carriers - which would permit large buyers to bargain directly with sellers - would seem to answer to the problem of pipeline operators collecting the rents.

Section 6: The Exploration and Development of Conventional Crude and Natural Gas

In this Section we will consider non-frontier conventional oil and gas. Frontier exploration and development and non-conventional oil will be dealt with in later Sections.

At the present time, an incentive tax system is the principal policy instrument for encouraging exploration and development. Rights to explore and produce oil and gas from Crown lands (we will ignore freehold mineral rights) are, in effect, auctioned. These costs are deductable as developmen t costs for corporate tax purposes. Exploration expenses are immediately deductible. Development costs are deductible on an accelerated (30 percent) diminishing balance basis. At the present time these costs can be deducted against income from any source. The resulting tax postponement is, in effect, an interest-free loan of the taxes postponed. It is, needless to say, enormously valuable. Furthermore, resource profits (a defined term) are reduced by a resource allowance of 25 per cent and by an earned depletion allowance of up to 25 per cent based on one-third of actual exploration and development expenses. The latter amounts can be carried forward if not claimed against current resource profits. The resource allowance was granted in 1974 as a rough *quid pro quo* for the decision to disallow the deduction of provincial royalty payments for federal corporate tax purposes.

Under a unitary state, the deductibility of royalties could be resumed and the resource allowance abolished. Indeed, under a unitary state with a national trading agency, if all mineral rights were Crown owned and all exploration and production rights were sold at auction, the rationale for royalty charge would largely disappear.* Because rights to

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* However, as Meyer Bucovetsky has shown, a royalty system does encourage exploration because the state, in effect, shares the risk.

explore and produce oil and gas from Crown lands are now sold at auction and, assuming no collusive bidding, royalty rates and the corporate tax are capitalized in the prices paid to the Crown to yield an after-tax rate of return comparable with other investments of the same risk. Thus through capitalization in land prices the province recaptures all federal corporate tax incentives in higher land prices assuming that oil and gas prices do not rise unexpectedly after the bidding takes place. It follows, therefore, that with some exceptions to be discussed below, no corporate tax concession designed to encourage petroleum exploration and development can be effective.

Abolition of the earned depletion allowance would result in a windfall loss to exploration - development corporations because of the consequent reduction in the value of the land already acquired. In the future, the loss of the concession would be capitalized, of course, in lower bids for exploration and production rights.

The increase in the effective tax rate through the withdrawal of the depletion allowance would reduce the corporate funds available for investment by reducing retained earnings. It is difficult to assess the materiality of this effect on future investment. If the self-imposed constraints of management related to the maintenance of control were not at issue, the ready access to funds in the capital market for corporations with resource profits would make the resulting reduction in their cost flow of little importance. But the

managerial constraints are real. Presumably, and not surprisingly, executives are risk averse when it comes to decisions that could effect their own positions. They are seemingly willing to accept a lower rate of return on corporate investments that can be financed through retained earnings. However, this problem (if such it is)is not unique of course, to the petroleum industry .

Joint venture arrangements that are prevalent in the petroleum industry allow a pooling of risk that cannot usually be achieved in most non-resource industries. There is therefore no *a priori* argument in favour of tax concessions of any kind to offset the riskiness of exploration even if one could be imagined that would not be capitalized in higher land prices.

In as much as the earned depletion allowance is offset by the capitalization of the benefit in higher bids for land, there is no reason to believe that the earned depletion allowance induces a level of investment in oil and gas that is too large relative to the investment in other industries subject to higher corporate tax rates. However, because it is only applicable to "resource profits" the earned depletion allowance creates a barrier to entry for corporations not already established in the production of oil and gas. This is an important consideration because it sustains and strengthens the cartel-like, foreign dominated industry structure that exists in the petroleum market.*

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* Indeed, all fast write off incentives create a barrier to entry for new enterprises that do not have current income against which these expenses can be deducted. The delay in obtaining the deduction is extremely costly.

Perhaps the most decisive evidence to support the argument that the major petroleum corporations face no cash shortage is the recent spate of acquisitions. The major internationals have been acquiring control of other corporations, many of which are quite outside the energy sector. If the tax royalty regime were judged to be inhospitable, the exploration and mineral rights sold by the province would be zero. In fact, the prices received have risen like skyrockets. This suggests that the industry finds them exceedingly comfortable at present given projected oil prices. If the corporations were anxious to invest more in oil and gas but were cash poor they would not be diversifying.

The argument for the withdrawal of the federal earned depletion allowance on future conventional oil and gas exploration and development therefore seems unassailable.

What is abundantly clear is that, given the existing Canadian situation, federal corporate tax concessions are ineffective in stimulating exploration and development and the federal revenues foregone are essentially captured by the provinces through higher land prices. Moreover, the allowances create a barrier to entry into an industry already plagued by bigness. Because the allowances lower the effective tax rate, they increase retained earnings. Foreign owned corporations are therefore able to expand in Canada in the petroleum industry and others by virtue of the Canadian corporate taxes foregone. The Canadian taxpayer is, in effect, making a gift of Canadian assets to non-residents. On efficiency grounds it is therefore proposed that the earned depletion allowance be gradually phased out by denying the earned depletion allowance for future exploration and development expenses.

Section 7: Non-Conventional Oil

It was argued earlier that higher crude oil prices in Canada will restrain future demand and increase the recovery of conventional crude from known pools. Until the magnitude of these responses is known it would be premature to undertake extraordinary measures to increase the domestic oil supply on the basis of efficiency considerations. As with the information derived from frontier exploration, however, a case can be made for public subsidy of the development of the technology of synthetic oil extraction from the tar sands and for processing heavy oils to obtain a product that is roughly substitutable for conventional crude. The justification is the same: to a considerable extent the technology has public good characteristics that probably preclude the private investor from capturing through product sales the costs involved. There is no doubt that unless the price of conventional crude is astronomically high, synthetic crude can not be produced on a large scale with existing technologies without massive capital or other subsidies.

It would therefore appear that investments beyond the pilot plant stage are not justified under the efficiency criterion except as a hedge against the sudden loss of foreign crude oil and as a hedge against the possibility that higher oil and lower natural gas prices will not induce substantial demand and supply responses in the longer term. These are not trivial exceptions of course. Although the financing of the several extant tar sands and heavy oil projects differ one from another, it is worthy of note that the latest Alsands proposal by a consortium headed by Shell Oil involves, in essence, that the federal and provincial treasuries would forego taxes otherwise payable on the current flow of resource profits of the consortium members until all of their investment costs were recovered. To all intents and purposes, the Canadian public would provide about one

half of the requisite $5 billion in capital without cost to the consortium. The market for the output would be assured and the world price for the output would be guaranteed.

If one looks upon the potential after tax and royalty profit to be garnered from a public gift of say, $2.5 billion of fixed assets as a management fee, one might well ask whether the proposed arrangements are the least costly from the point of view of the public purse.

Doubt has already been expressed about the economic wisdom of proceeding much beyond the synthetic oil projects already launched until Canadian conventional oil prices have been allowed to rise to world levels and remain at those levels for a sustained period. However, should it be deemed desirable to proceed from an abundance of caution, the concessionary financing proposed by the petroleum industry seems ludicrously, perhaps obscenely generous. Because much of the capital would be public, it would seem not inappropriate to have public ownership, although cost overruns on public projects are notoriously large and common. An alternative would be the contingent repayment loan scheme.

The scheme would have the following features:

- each non-conventional project would be established under a new and distinct corporation;

- for every dollar invested by the shareholder in the corporation the government would lend, say, $5;

- when and only the corporation's cumulative after corporate tax income* exceeded the sum the shareholders

* The corporation would be allowed to deduct, in calculating taxable income, only that portion of the capital costs financed by shareholders either by way of share purchase loan redemption.

had invested prior to the generation of income would interest on the government loan be charged and the loan become repayable on an amortized basis;

- the interest rate and the amortization period would be concessionary if necessary.

Such a scheme would "solve" the financing problem yet limit the concession for successful projects to the interest foregone and/or the favourable interest and repayment terms. Under the scheme proposed, the public purse would bear a disproportionate share in the loss of unsuccessful ventures but would not share in the gains from those that were successful.

Still another alternative would be a government guarantee of a premium price over the world price with, of course, no excise tax being levied. While attractive in its simplicity, this method probably would not suffice to overcome the problem of the lack of "up front" cash for projects the capital market judges to be quite risky.

Either method of subsidizing the projects would seem infinitely preferable to the arrangements proposed by the consortium---unitary state or no unitary state.

The present consortium proposals might be characterized as follows: the Federal Government (and some provincial governments too)puts up billions in capital through foregoing taxes. The provincial governments of the producing provinces eventually collect royalties. The Federal Government may never collect a penny of corporate tax if the profits are reinvested in other projects. The supranationals reinvest the profits earned on the basis of the taxpayers

assets in order to purchase additional Canadian assets. The contingent repayment loan scheme, or some alternative scheme with similar attributes, is desperately needed. To reiterate: in this industry a gift from the federal treasury is, in large part, a gift from the Canadian taxpayer to non-resident share-holders of supranational companies and to the treasuries of the producing provinces.

Section 8: Frontier Exploration

In the absence of government controls, the rate of depletion of known reserves depends upon the producer's discount rate and the expected future price of the output. The world price of crude oil, as modified by Canadian and American policies, is the crucial determinant. The costs of exploration, development, production and transportation of arctic and offshore crude are so enormously high that unless extremely large reserves are discovered and the world price is also extraordinarily high (and not blunted by government controls), frontier oil is likely to cost in real terms more than the imported oil it would displace. This is especially the situation with respect to frontier natural gas, for there are large known and much more accessible reserves available. Why then the frontier exploration allowance that allows an unlimited write off against other income of 166.6 per cent of frontier exploration costs? It has been widely reported that, under some circumstances at present a dollar of investment in frontier exploration can cost the treasury well over one dollar because the frontier allowance is provided over and above the other allowances and concessions de-scribed above.

The answer to the foregoing question is by no means apparent in economic efficiency terms. To all intents and purposes what is being "bought" with the frontier exploration subsidies is information about the size of the stock of potential reserves - reserves that are most unlikely to draw down in the foreseeable future if efficiency criteria alone are applied. Because of the public good characteristics (spillover effects) of such information, an element of public subsidy in acquiring it seems justified. As explained before, individual private investors cannot capture all the benefits arising from the information obtained and, in the absence of subsidies in one form or another, too

little information may be generated.(The information almost certainly could be obtained at a lower cost than by the existing tax concessions.

The contingent repayment loan scheme previously mentioned would accomplish the same purpose at lower cost to the public purse. What the additional information is "worth" in terms of investment opportunities foregone is an open question. What is clear, however, is that if we put aside for the sake of our discussion the land claims of native peoples in the far north, under a unitary state all of the net collective benefits of offshore oil and gas could be collected through a trading agency the profits of which accrued to the national treasury.

The coastal provinces claim all non-arctic offshore mineral rights. This too would be a non-issue under a unitary state.

Although the offshore mineral rights question has not yet been settled, had those rights been transferred to the coastal provinces and commercial extraction were to take place, the prospective battle over resource revenues would be the same as the present federal-Alberta tug of war over revenues. It does not seem to occur to Albertans, and one might ask whether it would occur to the residents of the coastal provinces either, that without the massive federal tax expenditures embedded in the past corporate tax treatment of petroleum and natural gas, the exploration and development, upon which current oil and gas provincial revenues are based, probably would not have taken place at all!

Section 9: ROYALTIES

Under the existing Canadian constitutional structure and the federal reliance on the corporate income tax as an important means of finance, the federal disallowance of provincial royalty payments as an expense is inescapable. Without such a disallowance the province could unilaterally capture all of the rents resulting from unanticipated price increases by increasing royalties (these would not, of course, have been captured by the province in earlier land sales).

Because the federal Government must not allow provincial royalties as an expense in calculating corporate taxable income is the resource allowance necessary as a rough offset? Leaving aside the politics of the matter, the answer is unequivocally no. Like the earned depletion allowance restricted to "resource profits", the resource allowance that is similarly restricted encourages corporate concentration. Leaving aside the cash flow implications, like the earned depletion allowance it serves no useful purpose in encouraging future exploration and development because the net effect of the disallowance of royalties and the positive resource allowance are being capitalized in higher land prices* to the benefit of the treasuries of the pro-vinces.

Having said this, however, it must be admitted that royalties are as legitimate a business expense as any other. The disallowance effectively doubled a corporation's total royalty expense - an expense that Alberta substantially increased with respect to "old" oil after 1973. Nevertheless, the net effect of the unexpected price increase for oil, plus these offsetting royalties/tax changes, undoubtedly was positive: witness the dramatic increase in land prices to which we have previously alluded (recal too that the other tax concessions remained unchanged.

* It must not be forgotten that these land costs <u>are</u> a deductible expense for corporate tax purposes.

It is painfully apparent that there is no painless and elegant solution to this tangled situation. It is also painfully apparent that the situation should not be perpetuated indifinitely. In this spirit it is therefore proposed that:

- the federal resource allowance be withdrawn

- the disallowance of provincial royalties be continued until the Government of Alberta rolls back its royalty rates to pre 1973-4 levels and freeze them at that level

- should the Province agree to this roll back and freeze royalties the federal excise tax would be increased by an amount necessary to compensate the Province fully for the revenues lost as a result of the royalty rollback.

It is the intention of this proposal that the flow of oil rents accruing to the province at this prevailing price of \$13-\$14/barrel be maintained while, at the same time, restoring the integrity of the corporate tax both by a restoring the deductibility of royalties (albeit rolled back and frozen royalties!) and by withdrawing the resource allowance.

To restate the obvious for emphasis: under a unitary state <u>none</u> of the serious problems discussed in this section would arise. Whether the rents were picked up by land prices, royalties or the profits of a government trading agency would be of little importance for they would all flow into the same pocket.

Section 10: <u>PUBLIC TRANSPORTATION</u>

Although there are undoubtedly many other possibilities, as an example, we will consider one of the most obvious means of conserving oil and gas: the increased subsidization of urban and short-haul inter-urban public transport and the increased taxation, directly or indirectly, of the private automobile - over and above the establishment of substantially higher gasoline and oil prices. Public transportation should be of low cost to the user. It should be safe, fast, convenient and reliable. Conversely, the private automobile must be made less convenient than it now is and substantially more expensive in American money to the user.

There is little point in making private automobile travel more expensive without providing a viable alternative mode of transportation. With the complete dependence of many individuals on their automobile for travel to work, shopping and school higher gasoline prices would constitute little more than a revenue raising tax with no possible behaviour adjustment unless alternativess were available.

With a unitary form of government, it would be a relatively simple matter to implement a consistent, integrated public transportation subsidy scheme across the nation because municipal authorities, as creature of the central government, could be instructed to follow a particular course with direct funding by the central government, on the basis of established criteria. With the municipalities being creatures of the province, the direct relationship is, to all intents and governments were unwilling to accept the funds for mass transit on some basis, negotiating the terms and conditions is usually painfully slow and monitoring extraordinarily difficult. Reducing the convenience of the private automobile by, for example, closing certain core areas of cities to them and/or by restricting the number of parking

spaces and/or raising parking charges to induce the greater use of public transit would be extremely difficult to achieve even within a province!

Nevertheless, as suggested later, despite the difficulties this kind of federal/provincial agreement must be worked out and some of the proceeds of its excise tax allocated to finance it.

Summary of Part B

It has been our purpose in this Part of the study to suggest the kinds of modifications that are necessary to achieve economic efficiency, and to maximize the collective benefit from non-renewable resources ownership - modifications arising because of the Canadian federal constitution and the fact that the producing provinces seek to capture all of the collective benefit.

Some of the policy changes proposed would seem to make sense whether or not Canada was a unitary state or a federation. Of particular importance in this regard were the suggestions that the earned depletion allowance be phased out and that the subsidization of non-conventional oil take the form of contingent repayment loans. The earned depletion allowance is virtually useless as an incentive because it is largely capitalized in land prices. It also encourages industrial concentration in an industry that is already cartel-like. It allows the giant supranationals to acquire Canadian assets with the Canadian taxpayers money. The proposed contingent loan scheme would ultimately be less costly to the public purse and would eliminate the special advantage that the supranationals enjoy under the arrangements they are suggesting. The explorations and development subsidy question is not without federal/provincial implications, however. To the extent that the federal corporate tax incentive is capitalized in land prices, the producing provinces capture the federal incentive but do not share the proceeds of the land sales. Under a unitary state it would not be of significance, of course. Similarily, federal taxes foregone in the financing of non-conventional oil projects may never be recovered. The producing provinces will eventually obtain royalties.

Not surprisingly, the federal-provincial tug of war over the division of the collective net benefits from the revenues complicate the capture of the rents from unexpected price increases. Under a unitary system rent capture would be accomplished in a straightforward manner by a state oil and gas trading agency buying for domestic producers by tender and, in effect, selling oil at the world price and gas by auction. Because the provinces could increase their oil royalties and thereby capture all the rents such a scheme would not work under a federal state without provincial co-operation - co-operation unlikely to be forthcoming! For the reasons cited earlier, an excise tax on crude oil levied at the wellhead seems the best alternative. It sidesteps both the royalty issue and the issue of the federal right to tax provincial agencies. The tiered excise tax structure proposed should eliminate the barrier to expanded secondary and tertiary recovery.

The situation with respect to natural gas is less straightforward, however, given that, for efficiency reasons, its price in Canada should be allowed to find its "competitive" level and not be dominated by US gas price regulation. If the Federal Government ceased to control the Toronto gate price Alberta could increase its royalties. One "answer", which is most unsatisfactory, might be the threat of a punitive increase in the proposed federal export tax triggered by a further increase in provincial gas royalties. However, if the producing provinces were to share in the proceeds of the gas export tax that filled the gap between the market price in Canada and the U.S. price, the producing provinces might agree to freeze their gas royalties. Federal deregulation of the price and volume of gas exports would also be attractive to the producing provinces.

All in all, it would seem that with some ingenuity policy modifications could be devised that would meet our efficiency

-collective benefit maximization goals without the use of the most draconian constitutional powers of the federal government if the Government of Alberta did not use its draconian power to restrict output! Had the Federal Government adopted in 1973 the measures hypothetically proposed in this Part is there any doubt, however, that those draconian powers, or something similar, would have been adopted by Alberta? What is being suggested here is that only one <u>half</u> of the total windfall benefit resulting from the price change be captured for the benefit of Canadians generally:

I cannot forebear a wry observation that perhaps will provide a needed perspective with respect to the essence of the problem that underlies this Part of the paper. Imagine if you will a simplified Carter Commission - like tax structure that had the following attributes:

1) a personal income tax rate of 50 per cent with corporations withholding tax on profits at the same rate for both resident and non-resident shareholders

2) resident shareholders credited with taxes withheld at the corporate level

3) full taxation of share gains (adjusted for retained earnings) on an accrual basis.

4) The resource property rights of a province are deemed to be held by a corporation with the residents of the province deemed to be shareholders. The costs of acquisition being zero, the proceeds from the sale of rights and from royalties constitute the income of the corporation. The corporation withholds tax on behalf of residents and remits to the federal government.

(Another variant of the Carter "approach" would be to deem that each Alberta resident had an inputed income equal to his share of the province's oil and gas revenues, and to require the governments of the provinces to withhold and remit half of these revenues to the Federal Government on behalf of the province's residents. After all, provincial governments do withhold and remit federal personal income tax on behalf of their employees!)

With such a tax regime the fight over the allocation of oil and gas rents would be a non-issue. The lucky winners would keep half of their windfall gains and the other half would be available to be distributed among Canadians generally in one way or another. (The main loophole, and it is trivial in comparison with the present system, would be the increase in the share prices of foreign held corporations that could not be taxed by the Government of Canada.)

It almost certainly is not possible to implement an "ideal" tax system. But an awareness of such a system certainly facilitates the identification of the source of our problem, however.

In the next Part we consider the disposition of the rents collected for the benefit of Canadians generally as a result of the "proposals" put forward in this Part.

PART C: A POSSIBLE STRATEGY

Consider the following "facts":

(1) Since 1973 the world price of crude oil has risen dramatically from about \$4-24/barrel pulling in its wake the price of natural gas.

(2) Even though the Canadian crude oil price has only increased by about half as much, the Government of Alberta and the oil and gas producers have realized enormous increases in their revenues. The Department of Energy, Mines and Resources estimates that, should the Canadian oil and gas prices remain unchanged, in 1980 the net operating income of producers would be \$12.6* billion shared roughly as follows: producers 45 per cent (\$5.8 billion); provinces, 45 per cent (\$5.4 billion); and federal, 10 per cent (\$1.43 billion).

(3) Not only is the federal "take" on behalf of all Canadians generally relatively trivial, when the total financial involvement of the Federal Government in the oil and gas price issue is considered the following situation is revealed.

* Clearly all of this amount is not rent; net operating revenues would not be zero had the oil and gas price changes since 1973 not taken place. Because prices have roughly tripled since 1973, it would not seem unreasonable to suppose that about one half to two-thirds of this figure represents "rent" - prices over and above costs.

Revenues	($ millions)	
Corporate Tax	1,380	(as above)
Oil Export charge	651	
Gasoline excise	434	
	2,465	
Expenditures		
Import compensation	1,597	
Equalization payments	832	(with respect to petroleum revenues only)
	2,429	
Net Federal Revenues	36	

(4) We estimate that in 1980 the rent contribution of Ontario consumers (individuals and businesses) to the net income of producers (assuming no further increase in oil or gas prices) to be as follows:

Consumption	1973-79 Price Difference	Contribution($billions)
oil 190 mil./B	$10/B	$1.9
gas 700,000 mcf	$1.70/mcf	$1.2
		$3.1

This is roughly 25 per cent of the total net operating revenues of $12.6 billion, as stated above.

Attachment to a letter from D.W. Scrim, Director General, Financial and Fiscal Analysis, Energy, Mines and Resources, 18th July, 1979

To the best of my knowledge no one has suggested that there should be <u>any</u> reduction in the flow of funds now being received by the producing provinces under the present arrangements. In other words, the producing provinces would continue to receive about $5.8 billion per year in oil and gas revenues. The Heritage Fund would continue to grow at $1.5 billion/year and so on (declining oil output being it might be assumed, offset by rising natural gas output). The issue is entirely confined to the disposition of the <u>additional</u> $7.7 billion in the net operating revenues of producers (also estimated by EMR) that would result if Canadian oil and gas went to the world level in 1980. (The precise year is not germaine to our argument.) With the existing royalty/tax regime in place, the producing provinces would receive an <u>additional</u> $3.6 billion, the producers and <u>additional</u> $3.2 billion and the Federal Government an <u>additional</u> $0.9 billion. Ontario consumers would contribute an <u>additional</u> annual amount of about $3.1 billion. The federal net revenue position would be quite transformed, however. It is estimated that the trivial $36 million shown above would rise to $1.3 billion. (This would be the net effect of the following changes: + $0.9 corporation tax - $0.6 export charge revenue + $1.6 import compensation saved - $0.6 additional equalization.)

In my view it is indisputable that, on efficiency grounds, the price of crude oil in Canada should rise quickly to the world level. It is also my view that tying the price of natural gas to the price of crude in BTU equivalent terms is a serious error. However, leaving aside the latter point for a moment, in my opinion it also would be a most serious error to move to the world oil price under the existing tax/royalty regime. Even under a federal corporate tax system of enormous generosity, the producers cannot find profitable investment opportunities in oil and gas at current prices, as the increases in the prices bid for land

and their recent diversification moves prove. What public purpose would be served by providing them with an additional annual windfall of $3.2 billion? The fact that the gift would largely accrue to the benefit of non-residents hardly makes the prospect more enticing.

What is needed, therefore, is a rapid move to the world crude oil prices in Canada but the demise of this windfall gain to producers.

It can be expected that the petroleum industry, being what it is, will threaten to withdraw exploration and development expenditures from Canada and in the face of any tightening of the current tax regime. The industry would be less than National - and above all in the face of any tightening of the current tax regime it is rational in terms of its own game - not to spend a great deal of money to persuade-cajole -frighten and threaten Canadians. The stakes are large.

The question of providing an additional $3.6 billion to the producing provinces is even more disputatous. In terms of the Constitution one might suppose that the case for the producing provinces is quite clear in demanding that they keep for themselves all the benefits to be derived from their natural resource rights. It is difficult not to choke a little, however, when one realizes that the founding fathers no doubt expected that natural resource rights would be alienated by the provinces, as was the practice at the time. Under that supposition (proven false in the event) their decision to prohibit taxation by the federal Crown of the provincial Crown made eminent sense. We reluctantly assume that the federal taxation (on behalf of Canadians generally) of the income from the provincial ownership of all natural resources is not politically feasible in the near term. What follows, therefore, is a kind of second best "solution".

To go back to 1867 (or before?) and try to calculate annual per capita costs and benefits for each province for each federal policy would be as silly as it would be impossible. Almost all of those who gained and lost are dead. Children can hardly be brought to account for the evil acts of their forebearers, nor do the progeny of those who suffered deserve compensation from those who were not responsible. The policy "mistakes" of the past century - if such they were - provide no guide to current oil and gas policy.

It would be difficult to argue that the "average" resident of Ontario would be completely unable to finance an additional increase in his oil and gas bill of about 70 per cent. Conversely, it is equally difficult to argue that Alberta's residents, in general, "need" the money. They have no sales tax to pay and their government is already running a surplus that is more than twice as large as the deficit of the Government of Ontario with a population about five times larger. But this too is irrelevant. Individuals not averages vote. To assert that Alberta "doesn't need the money" is like asserting that incomes over a certain level (namely my own) should be taxed at one hundred percent. The foregoing, not withstanding, it is difficult to deny that there are hundred of thousands of Canadian individuals and families who have little if any discretionary income. They <u>do</u> have to heat their homes and cook their food. In many cases, they have no alternative but to drive to work. Ever higher energy prices for them will undoubtedly be a real hardship. The many voters who <u>believe</u> that they would be put in this position will find it damnably hard to accept the proposition that they, who "subsist" from day-to-day, should be more miserable now in order that the future residents of Alberta be protected against an unlikely (at least in their minds), distant event - no Alberta energy resources.

I believe the point just made to be valid, and I also believe that the crux of the matter is clear. If Canada were not an oil or gas producer, the increase in the world price of oil and gas would be a fact to which Canadians would simply have had to adjust, or would have to adjust. (It should be noted that because of the appreciation of their currencies, both West Germany and Japan - nations entirely dependent upon oil imports - have had little difficulty in adjusting to the increase in the world price of oil expressed in U.S. dollar terms for their currencies have appreciated dramatically since 1973 relative to the U.S. dollar.) It is also a fact that because Canada is energy rich compared with most other industrialized nations, Canadians have a <u>kind</u> of option. Canada has, without <u>obvious</u> dire economic consequences, postponed the full adjustment. Partly because it was unclear whether the world price change was permanent, partly because the magnitude of the series of increases was unanticipated and partly for simple political expendiency, it was decided to restrict and postpone the adjustment to higher oil prices. For the vast majority of voters the policy has worked extremely well. Fuel is cheap in Canada relative to, say, Europe. And fuel is readily available -- which is not true in the United States. The benefits of postponement of the present policy are apparent: the real costs of the policy, in terms of the waste of scarce fuels, are little understood. As far as most voters are concerned, higher fuel costs will hurt them and put their money into the pockets of both the oil companies, that are in a conspiracy to gouge them, and the Province of Alberta that has so much money that it doesn't know what to do with it. "Why, I read in the paper a while back about this here, what do they call it .... Alberta Heritage Fund, and do ya know ...." Any politician that would appear to permit the price of fuel to rise to enrich the oil companies that, in the eyes of most voters, are rogues and the Government of Alberta that doesn't know what to do with the money

its receiving now, would be asking for defeat. The element of truth in the voter's perception of the consequence of higher fuel costs makes it extremely difficult to persuade him or her that the other part of the truth - that there are real and important hidden costs - warrants foregoing the immediate and obvious benefit of low fuel prices. In matters of this kind, an ounce of concrete immediate personal benefit is worth more than a ton of abstract future diffused cost. Particularly when someone else, who you have never met, would probably have to bear the cost anyway - if there were any costs.

We have here the interface among the several realities: Premier Davis' reality (and Prime Minister Clark's too!) is the prevalence of voters with the perceptions we have just discussed. Premier Lougheed's reality is his perception, a perception he shares with virtually all Albertans, that they have a right to the additional $3.6 billion annually. And then there is the economists' reality of waste - of Canadians frittering away an important advantage.

Although it would be too much to hope that most voters would not be opposed to higher energy prices, the degree of their antagonism would be largely dependent upon their perceptions of the intended disposition of the rents collected. The perception that the higher prices were fattening politicians, bureaucrats, oil companies generally, and foreign investors particularly, would, for example, engender almost universal rage. To that vitally important issue we will turn in a moment. But let us consider the means of collecting the rents and the magnitudes involved.

<u>Rent Collection method:</u> It seems to me that the <u>method</u> of rent collection should be as simple and as transparent as possible in order that there appear to be a simple conduit through which the extra revenues from higher fuel prices are

passed in order to finance the realization of widely accepted goals. The excise tax on oil at the wellhead would serve this purpose and would not deter the investment (and other costs) required to achieve higher recovery rates if the tax rate were to decline from primary to secondary oil recovery and from secondary oil recovery to tertiary recovery.

As explained earlier, it is proposed that a three tier excise tax on crude oil at the wellhead be imposed. Having established <u>for each pool</u> the quantity of oil that is recoverable by primary extraction, that oil would be taxed as extracted at the top rate - say $10/barrel. <u>Additional</u> oil extracted from the pool by secondary recovery methods would be taxed at, say, half the rate. When it could be shown that further extraction warranted the investment in tertiary recovery methods approval would be given to proceed. The additional oil extracted by tertiary recovery methods would not be taxed. Although hardly an elegant "solution", in my view it would be better to proceed along these lines than to try to impose an enormously complex windfall profits tax that would mean that investors would face great uncertainty as to the tax consequences of alternative decisions. (It would certainly capture "rents" for the lawyers and accountants!) A flat rate excise tax would "lock-in" conventional oil in known pools - quite likely cheaper oil than the synthetics.

Such an excise tax would pose no constitutional problems, and it would side step the question of federal disallowance of provincial royalties, a restriction that cannot be lifted until the latter are taxable by the federal government. It is therefore proposed that the Federal Government impose (perhaps on a two year phased basis) an excise tax of approximately $10/barrel on crude oil at the wellhead, tiered as just explained. Currently, such a tax would raise about

$5.5 billion annually. It would, however, reduce the federal government's import compensation payments by about $1.5 billion, against which would be offset the loss of oil export levy yielding about $0.6 billion and the gasoline excise tax yielding $0.4 billion. (The latter is, of course, an independent decision.) The annual net revenues therefore would be about $6 billion. This does not take into account the additional federal revenues that would result from "withdrawing" the existing ineffective earned depletion incentive to the petroleum industry.

Disposition of the Proceeds: There are, needless to say, an infinite number of ways to spend about $6 billion a year. The alternatives must be assessed both on economic and political grounds for, as just stated, voter perceptions of the merits of what they are getting in exchange for higher fuel prices are all important. It might be argued, for example, that the revenues should simply be acquired by the federal government in order to reduce its deficit from about $12 to $6 billion (ignoring subsequent effects on GNP!). Such a course would be deflationary, but we do not want to consider here whether this would be appropriate at time the tax would go into effect. Governments now being as unpopular as they are, one might well wonder if the average voter would perceive that his higher gas and fuel costs were justified if the reduction in federal borrowing were the payoff. I will, in any event, disregard this alternative.

In my opinion, the enrichment of unconditional equalization payments to the "have not" provinces should also be rejected. Admittedly, higher oil prices will raise government operating costs, as they will private costs. But there would seem no reason to compensate governments as such on this basis. Governments should conserve energy too. Provincial governments (that is to say, the "Governments of the Day") yearn

for the politically costless dollars they obtain from increased equalization payments. They can then "buy" votes through more generous programs without having to take the blame for tax increases. However, if, as we propose, individuals resident in all parts of Canada receive an income to offset higher fuel costs, the claims of the provincial governments can be rejected. If their residents have the money these governments can raise their taxes should they decide that this were appropriate. In my view, at this point in time, an additional dollar of public services is unlikely to yield, or be perceived to yield , as much individual satisfaction as the dollar of private consumption foregone. In short, I think that the rents resulting from a move to the world oil price should be channelled back to individuals: not flow to governments for the purpose of enriching existing programs or financing new programs unless those governments are willing to bear the political cost of rising taxes.

Let us first consider some of the means available for maintaining the disposable income of individuals in part to compensate for higher energy prices and in part to replace the private consumption that the excise tax on oil would preclude. To reiterate: we seek to prevent an increase in public expenditures at the expense of private expenditures. We seek to distribute the additional rents to the residents of Canada generally.

Heating costs, electricity costs and, perhaps to a lesser extent, automobile fuel costs almost certainly represent a larger fraction of the budgets of low income individuals and families than they do of those in the middle and upper income brackets. As indicated above, a further sharp increase in energy prices would undoubtedly be a source of signficant hardship to those who have little, if any, discretionary income. Moreover, to be painfully pragmatic,

what the "poor" lack in income they make up in numbers. In terms of political arithmetic, if not on the basis of equity, some apparent offset to the jump in energy costs would be required in order to obtain the reluctant ac-quiesence of voters to higher fuels costs.

In a unitary state, the simplest means of providing amelioration would be through the elimination of the retail sales tax. In 1976-77, the tax raised about $5 billion for the provinces. The incidence of the one is probably not too different from that of the other, at least in consumers' (voters'!) minds. The Canadian situation would make this a peculiar way to proceed, however. Retail sales taxes are imposed in all of the provinces except Alberta (for obvious reasons!). For the Federal Government to collect an oil excise tax of national applicability and then to distribute the bulk of the proceeds to all of the provinces except Alberta might be thought of as poetic justice by everyone except Alberta residents! The fact that the Province of Alberta has abundant revenue does not mean that some Alberta residents would not be hit by higher energy costs. From the view of voter perceptions it is also important that the offset to higher energy costs be available to <u>all</u> Canadian residents without regard to the province in which they are domiciled.

The withdrawal of the federal manufacturers' sales tax, widely acknowledged as an extremely bad tax, would not pose the same problem. (In fiscal 1978, this tax raised a little over $4 billion.) Furthermore, it would assist the domestic sales of the manufacturing industries of central Canada - industries where employment would suffer from higher oil prices and will also suffer from lower tariffs. Canadians in all provinces consume some manufactured goods so that the benefit would be general. The resulting decline in the prices of these goods would offset, to some extent, the

inflationary effects of the increase in oil prices. Such an offset would create some serious difficulties, however.

From a political point of view, a tax reduction in the manufacturers' sales tax would be less attractive than the abolition of the retail sales tax because most buyers are unaware of the manufacturers' sales tax. An immediate across -the-board reduction at the counter associated with a retail sales tax or, as we will recommend, a refundable personal income tax credit, would be much more obvious. Furthermore, the elimination of the manufacturers sales tax would be capitilized in higher share prices for manufacturing corporations and, as we all know, manufacturing is concentrated in the central provinces. Eliminating the manufacturers sales tax would not appear to be an even handed offset.

A <u>universal</u> refundable personal income tax credit, along the lines of that recently adopted for family income is, it seems to me, far and away the best form of compensation for still higher oil costs. Income related, and with relatively gradual tax-back provisions which have minimum disincentive effects with respect to work effort, the refundable credit can do what normal tax credits cannot do: put money in the hands of those who need it most - those with relatively little or no taxable income. By making the credit available at least in part, prior to the increase in the price of oil, the complaint that the beneficiaries would die in the dark and cold before the money reached them would lose its force. It would apply to <u>all</u> residents of Canada without regard to their location. The administrative machinery for implementing such a scheme is now already in place. Every Canadian would be aware of the offset and could recognize that the higher energy prices were not enriching producers or governments. I might add that proposals that have been advanced to subsidize the energy costs of the poor would be counter-productive. One of the main reasons for moving to

the world oil price is to <u>raise</u> oil costs and induce conservation and substitution. A scheme that provided government loans to finance the conversion or update of furnaces, and of the installation of storm windows and insulation, at interest rates and payback periods that were income related, would also seem to make sense. But, except for major investment outlays that might exceed the conventional borrowing capacity of individuals, relieving the pocket book of the taxpayers through reduced taxes or income supplementation would be infinitely preferable. In most instances the self-interest of the consumer will result in the most effective means of energy conversation being employed.

But what of the subsidies to the oil and gas industry? In our view the following propositions make sense:

(1) Until the effects of higher oil prices on demand are more apparent the rate of investment in extremely high-cost non-conventional oil should be geared to reducing Canada's dependence on foreign oil <u>not</u> energy self sufficiency. <u>We should not proceed on the assumption that X major projects should be undertaken now in order to eliminate forecast oil imports of Y by date Z</u>. Provision <u>should</u> be made for buffer stocks to tide the nation over short term shocks. There should be a contingency plan that might involve, for example, a temporary shut down of certain petro chemical operations.

(2) Frontier exploration should continue to be subsidized in order to increase the information available about the size of the nation's non-renewable energy stocks. However, the form of the subsidy should be altered to ensure that the the bulk of the costs are not borne by all Canadians as taxpayers while a large share of the potential benefits are captured by a few shareholders.

(3) The federal corporate income tax provisions relating to the petroleum industry should be overhauled, and all concessions removed except the accelerated writeoff of exploration and development costs. Given the capitalization of the concession in higher land prices, earned depletion is ineffective except as a transfer of wealth from Canadian residents generally to the residents of the producing provinces. It also creates barrier to entry into the industry. The withdrawal of earned depletion should only apply to future expenditures.

(4) The elimination of the tax concessions (expenditures) buried in the corporate tax structure would increase federal revenues. The proceeds might be used to finance contingent repayment loans for approved nonconventional oil projects. Another, simpler alternative would be to subsidize the price of the output of such projects (e.g. pay a premium over and above the world oil price with no oil excise tax applicable either). The latter approach may not be effective if conventional borrowers need "up front"money.

(5) If the producing provinces were to rollback and fix their royalty rates at 1973 levels, the deductability of royalties for federal corporate tax purposes should be restored and the provinces compensated for the revenue loss. The ultimate solution, however, is to move towards some form of federal taxation of the provincial income from natural resource ownership. This should <u>not</u> be confined to non-renewable energy resources and certainly not to the oil and gas producing provinces.

(6) The provinces, in the wake of the federal withdrawal of the special excise tax on gasoline should gradually increase their taxes on gasoline and use the proceeds

to subsidize urban transport. It would not seem to make sense for them to make this move until the effects of the crude oil excise tax had been absorbed.

Adoption of the foregoing proposals by the Federal Government would leave the producing provinces extraordinarily un-happy. Too unhappy. I would suggest the following. First, the petro-chemical complex now located in Sarnia should be phased out and the producing provinces allowed to develop these industries should they so choose. Secondly, the price of domestic gas should be deregulated and the pipeline companies converted to common carriers. The quantity of gas exports should also be deregulated by the federal Government and an export tax imposed to slightly more than close the gap between the domestic and U.S. gas prices in a manner similar to the present crude oil export tax. The producing provinces should receive, in lieu of higher gas royalties, some share (most?) of the proceeds of this export tax.

The strategy just sketched, or something along similar lines would:

- minimize voter opposition to a move to world oil prices and provide even handed compensation across Canada

- minimize the coercion of a minority province and avoid the deployment of the most draconian federal measures

- increase the efficiency of the incentives provided to the petroleum and other industries

- not increase the politically costless funds available to provincial governments

- have minimal effects on aggregate demand because the proceeds of the excise tax would be returned to individuals

- deny a windfall gain to the supranational petroleum companies, and,

- through more efficient tax incentives, deny foreign shareholders a completely unwarranted gift of Canadian assets

The reduction in the selling price of provincial land as a result of the withdrawal of earned depletion would reduce the revenues of the producing provinces. This would be more than offset by allowing the producing provinces to share in the proceeds of the proposed gas export tax. The Alberta Heritage Fund and the (similar but much more modest Saskatchewan Fund that encompasses potash and other resources) would continue to grow rapidly unless present provincial legislation were changed.

<u>The Challenge</u> : A high degree of consensus on a public policy issue is a rare event in Canada. The enormous breadth of the country, the differences in the ethnic backgrounds and languages of the people in the various regions, the differences in mix of industries from region to region, and last but not least, climatic and topographic differences all make for great diversities of attitudes, perceptions and economic interests. This diversity is the source of one of the virtues of the country because, under a federal system, it is possible for Canadians in different parts of the country to "do their own thing". This surely must be one of the joys of being a Canadian: there is no such thing as <u>a</u> typical Canadian.

While a delight in so many ways, the low degree of national consensus makes it extremely difficult to generate national economic policies, particularly when the issue involves, as

the energy issue does, not only a conflict between the interests of consumers and producers (as in the United States) but also between producing and consuming provinces with the federal government seeking to resolve all of these forces pushing in different directions.

One cannot help but think that, although there is not a "typical Canadian", there too often seems to be a typical Canadian policy response under these circumstances. In order to resolve the conflict about what should be done we either do nothing or throw away our advantages. Being unable to agree on how to share the benefits of an economically efficient policy we forgo the potential gains. We either give away the advantage to non-residents or we build monumental symbols - preferably made of concrete and steel. Would it not be a delightful change if, in this extremely important "for instance" the nation turned the advantage to good account and did not squander it in pursuit of the unobtainable but costly goal of energy self sufficiency: a policy that would serve as an umbrella under which every kind of stupidity could be rationalized while enriching the non-resident shareholders of the corporations that dominate the Canadian petroleum industry.

Addendum

At the present time the flow of residual oils in Ontario indercuts, to a significant degree, the eastern market for natural gas. If, as I have proposed, the Sarnia petrochemical complex were phased out this problem would gradually disappear. However, this would postpone for too long the substitution of natural gas for crude oil. It is therefore proposed that in the medium term exports of residuals be actively encouraged and, if necessary, the quantity made available in the eastern domestic market restricted. These

measures would tend to induce an additional investment in eastern refining facilities designed to reduce the quantity of residuals produced.

APPENDIX A
TABLES TO ACCOMPANY THE PAPER:

"THE FEDERAL PROVINCIAL RELATIONS
DIMENSION OF THE CANADIAN ENERGY ISSUE"

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TABLE 1
GOVERNMENT REVENUE, EXPENDITURE AND SURPLUS OR DEFICIT
CANADA

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Compound Growth Rates 68/77	Compound Growth Rates 73/77
	(millions of dollars)											
Total Revenue	12027	14277	15296	16996	19283	22497	29599	31238	35058	35798	12.88	12.31
Total Expenditure	11729	12983	14797	16872	19503	21700	27895	34353	37595	42557	15.40	18.34
Savings (deficit)	298	1294	499	124	(220)	797	1704	(3115)	(2537)	(6759)	--	--
Capital Consumption Allowance	191	213	232	245	277	312	379	438	494	571	12.94	16.31
Gross Capital Formation	500	486	465	514	623	722	974	1125	1158	1221	10.43	14.04
Surplus (deficit)	(11)	1021	266	(145)	(566)	387	1109	(3802)	(3201)	(7409)	-	-

Source: Statistics Canada (13-213, January 1979)

TABLE 2
GOVERNMENT REVENUE, EXPENDITURE AND SURPLUS OR DEFICIT
ONTARIO

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Compound Growth Rates 68/77	73/77
	(millions of dollars)											
Total Revenue	3557	4171	4986	5562	6053	6887	8252	9033	10357	11671	14.11	14.10
Total Expenditure	3322	3799	4829	5668	6152	6830	8119	10139	11435	12501	15.86	16.31
Savings (deficit)	235	372	157	(106)	(99)	57	133	(1106)	(1078)	(830)	--	--
Capital Consumption Allowance	89	99	108	119	131	156	209	243	284	329	15.64	20.51
Gross Capital Formation	248	253	285	328	412	445	535	572	557	601	10.34	7.80
Surplus (deficit)	76	218	(20)	(315)	(380)	(232)	(193)	(1435)	(1351)	(1102)	--	--

Source: Statistics Canada (13-213, January 1979)

TABLE 3
GOVERNMENT REVENUE, EXPENDITURE AND SURPLUS OR DEFICIT
ALBERTA

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Compound Growth Rates 68/77	73/77
	(millions of dollars)											
Total Revenue	711	875	1051	1200	1335	1685	2750	3324	4046	5059	24.36	31.63
Total Expenditure	791	931	1099	1245	1402	1564	1940	2419	2801	3440	17.74	21.78
Savings (deficit)	(80)	(56)	(48)	(45)	(67)	121	810	905	1245	1619	--	91.26
Capital Consumption Allowance	35	39	43	47	50	59	80	94	111	130	15.70	21.84
Gross Capital Formation	81	87	94	111	113	145	226	309	250	306	15.91	20.53
Surplus (deficit)	(126)	(104)	(99)	(109)	(130)	35	664	690	1106	1443	--	153.40

Source: Statistics Canada (13-213, January 1979)

TABLE 4
POPULATION, PERSONAL INCOME, PROVINCIAL INCOME
UNEMPLOYMENT RATE, INFLATION RATE
CANADA

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Compound Growth Rates 68/77	73/77
Population [a]	20.744	21.061	21.377	21.569	21.830	22.095	22.446	22.800	22.992	23.291	1.30	1.33
Provincial Income												
Total [b]	55,769.7	61,688.9	65,543.2	72,294.8	81,166.9	96,386.3	116,103.8	132,367.2	152,403.1	167,966.1	13.03	14.90
Per Capita	2,688.5	2,929.1	3,066.1	3,351.8	3,718.1	4,362.4	5,172.6	5,805.6	6,628.4	7,211.6	11.59	13.39
Provincial Gross Domestic Product (Market Price)												
Total [c]	73,739.6	81,410.0	86,648.2	95,070.5	106,516.5	125,339.0	150,406.9	168,316.0	194,454.9	214,828.3	12.62	14.42
Per Capita	3,554.7	3,865.4	4,053.3	4,407.7	4,879.4	5,672.7	6,700.8	7,382.3	8,457.3	9,223.7	11.18	12.92
Personal Income												
Total [d]	55,588	61,712	66,553	74,018	83,867	97,741	116,760	136,201	156,130	172,220	13.39	14.21
Per Capita	2,679.7	2,930.2	3,113.3	3,431.7	3,833.6	4,423.7	5,201.8	5,973.7	6,790.5	7,394.2	11.9	13.70
Unemployment Rate	4.5	4.4	5.7	6.2	6.2	5.5	5.3	6.9	7.1	8.1	6.75	10.16
Inflation Rate (1971 = 100)	90.03	94.08	97	100	104.8	112.74	125.02	138.5	148.9	160.8	6.66	9.28

a,b,c,d, - in millions

Source: Statistics Canada (11-003E; 1963-1977; 71-201 January 1979; 13-213 January 1979)

TABLE 5
POPULATION, PERSONAL INCOME, PROVINCIAL INCOME
UNEMPLOYMENT RATE, INFLATION RATE
ONTARIO

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Compound Growth Rates 68/77	Compound Growth Rates 73/77
Population [a]	7.306	7.452	7.637	7.703	7.824	7.939	8.094	8.226	8.265	8.374	1.53	1.34
Provincial Income												
Total [b]	23,496.3	260,040.5	27,692.7	30,760.6	34,706.2	40,017.1	46,929.1	52,167	59,451.4	66,130.8	12.18	13.38
Per Capita	3,216.0	3,494.4	3,626.1	3,993.3	4,435.9	5,040.6	5,798.0	6,341.7	7,193.6	7,897.6	10.50	11.88
Gross Domestic Product												
Total [c]	30,771.4	34,061.4	36,282.2	40,000.2	44,982.1	51,821.8	60,704.6	66,600.9	76,136.7	84,651.4	11.90	13.05
Per Capita	4,211.8	4,570.8	4,750.8	5,192.8	5,749.3	6,527.5	6,790.2	8,057.2	9,212.5	10,109.4	10.22	11.56
Personal Income												
Total [d]	22,844	25,629	27,974	30,966	34,822	39,884	47,060	53,887	61,353	67,739	12.84	14.16
Per Capita	3,126.8	3,439.2	3,663.0	4,020.0	4,450.7	5,023.8	5,814.2	6,550.8	7,423.7	8,089.7	11.14	12.65
Percentage of Canada												
Federal Basic Tax (PIT) [1]	45.17	45.88	45.89	45.51	44.73	43.83	42.41	41.18	40.41	40.26	-1.27	-2.10
Corp. Taxable Income (adj) [2]	45.23	45.57	45.86	46.14	45.24	44.69	42.23	38.76	38.26	36.38	-2.39	-5.01
Unemployment Rate	3.6	3.2	4.4	5.4	5.0	4.3	4.4	6.3	6.2	7.0	7.67	12.96
Inflation Rate (Toronto) (1971 = 100)	90.59	94.19	97.70	100	103.06	107.12	123.9	135.8	146.0	157.3	6.32	10.08

a, b, c, d, - in millions
1. Based on assessmsent as of the December 31 cut-off
2. Based on assessments in respect of a single taxation year only

Sources: Statistics Canada (11-003E 1963-1977; 17-201 January 1979; 13-213 January 1979), Ministry of Finance

TABLE 6

POPULATION, PERSONAL INCOME, PROVINCIAL INCOME
UNEMPLOYMENT RATE, INFLATION RATE
ALBERTA

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Compound Growth Rates 68/77	Compound Growth Rates 73/77
Population [a]	1.526	1.561	1.600	1.628	1.655	1.683	1.714	1.768	1.838	1.900	2.47	3.08
Provincial Income												
Total [b]	4,528.3	5,038.5	5,478.5	6,029.8	6,922.0	8,774.2	11,499.9	14,446.6	16,951.5	18,923.0	17.22	21.18
Per Capita	2,967.4	3,227.8	3,424.1	3,703.8	4,182.5	5,213.4	6,697.7	8,171.2	9,222.8	9,961.1	14.40	17.57
Gross Domestic Product												
Total [c]	5,828.7	6,483.7	7,033.5	7,724.6	8,790.6	11,029.1	15,366.4	18,353.8	21,077.5	23,479.3	16.74	20.79
Per Capita	3,819.6	4,153.6	4,395.9	4,744.8	5,311.5	6,553.2	8,965.2	10,381.1	11,467.6	12,359.5	13.94	17.19
Personal Income												
Total [d]	4,111	4,589	4,953	5,534	6,267	7,471	9,019	11,085	12,961	14,672	15.18	18.38
Per Capita	2,694.0	2,939.8	3,095.6	3,399.3	3,786.7	4,439.1	5,262.0	6,269.8	7,051.7	7,723.3	12.41	14.85
Percentage of Canada												
Federal Basic Tax (PIT) [1]	6.99	7.11	7.17	7.17	7.26	7.36	7.93	8.75	9.25	9.62	3.61	6.92
Corp. Taxable Income (adj) [2]	7.91	7.34	8.71	9.07	9.40	10.27	15.02	20.69	18.85	22.61	12.38	21.81
Unemployment Rate	3.3	3.4	5.1	5.7	5.6	5.3	3.5	4.1	4.0	4.5	3.51	-4.01
Inflation Rate (Calgary) (1971 = 100)	91.03	94.77	97.66	100	103.9	110.61	120.9	134.6	145.8	158.0	6.32	9.32

a, b, c, d in millions
1. Based on assessmsent as of the December 31 cut-off
2. Based on assessments in respect of a single taxation year only

Sources: Statistics Canada (11-003E 1963-1977; 17-201 January 1979; 13-213 January 1979), Ministry of Finance

TABLE 7
GROSS GENERAL REVENUE*
GROSS GENERAL EXPENDITURE
FISCAL YEAR ENDING MAR 31,
CANADA

Source	1968[b]	1969[b]	1970[b]	1971	1972	1973	1974	1975	1976	1977	1978[c]
	(thousands of dollars)										
Taxes											
Personal Income Tax	1461957	1764302	2142443	2752508	2967097	3628859	4390316	5615716	6428710	7656788	11011100
Corporation Income Taxes	596020	660326	861606	763010	785824	977969	1204232	1887592	2091223	2180955	2534100
Real Property Taxes	34706	36312	42176	49588	50130	59631	63810	76776	84937	91620	N/A
General Sales Tax	1259626	139538	1675185	1786462	2009048	2331021	3005905	3595541	3663810	4565929	434000
Motive Fuel Taxes	791923	943206	1019853	1093934	1167748	1270713	1419400	1444139	1518416	1577037	1607200
Other	1143958	1397904	1808075	2060879	2179088	2329253	2590630	2943898	3382699	4470924	10037400
Total, Taxes	5288190	6197288	7549338	8506381	9158935	10597446	12674293	15563662	17169795	20543253	25623800
Natural Resource Revenue[a]											
Forests	102847	125423	166268	125122	132828	210297	351855	254642	155410	167405	N/A
Mines	53475	56858	66533	76548	55093	55401	117352	319795	290867	241071	N/A
Oil & Gas	291442	358716	328770	303980	351575	411383	681361	1707612	2058201	2510168	N/A
Water Power	41709	41890	46256	50116	52621	58727	30338	33098	35926	36075	N/A
Other	32762	37440	43825	46152	48426	52725	56930	61263	62824	66700	N/A
Total, Natural Resource Revenue	522235	620327	651652	601918	640543	788533	1237835	2376411	2603228	3021419	4982300
Total, Privileges, Licenses & Permits	934349	1061925	1138949	504094	555499	628077	683143	705867	852564	894369	1442100
Total, Sales of Goods & Services	150553	265001	322027	366383	429753	525070	591778	627335	752179	919891	985900
Total, Return on Investments	670233	841005	1021090	1241001	1470427	1609649	1888391	2350813	2946142	3472094	4482200
Other	97351	116461	138064	137709	161029	190396	287238	313042	348487	397557	466400
Total Gross General Revenue From Other Sources	7140676	8481681	10169468	11357485	12416187	14339173	17362677	21937131	24672395	29248583	37982700

Table 7
Gross General Revenue
Gross General Expenditure
Fiscal Year Ending Mar 31,
Canada
(Continued)

Source	1968[b]	1969[b]	1970[b]	1971	1972	1973	1974	1975	1976	1977	1978[c]
					(thousands of dollars)						
General Purpose Transfers from other levels of Government & their enterprise											
Equalization	-	-	705647	898198	1071479	1093547	1443485	1773425	1978296	2086709	272000
Tax Revenue Guarantee	-	-	-	-	-	-	-	-	627608	1046918	80000
Share of Oil Export Tax	-	-	-	-	-	-	-	-	21206	-	-
Other	786053	862752	264403	341572	437475	400669	383920	478474	89677	115292	2625300
Total General Purpose Transfers	786053	862752	970050	1239770	1508954	1494216	1827405	2251899	2716787	3248919	2977300
Total Specific Purpose Transfer	1347557	1513986	1796015	2417408	2850834	3067041	3251454	4230307	5176067	5969967	7187200
Gross General Revenue	9274286	10858419	12935533	15014663	16775975	18900430	22441536	28419337	32565249	3846769	48147200
Gross General Expenditure	9333855	10645838	12485386	14848598	17310008	19063897	22042985	28037750	34317670	38973983	48675500
Surplus (Deficit)	(59569)	212581	450147	166065	(534033)	(163467)	398551	381587	(1752421)	(506514)	(528300)

* Financial Management Series
a Statistics Canada, Preliminary Revised Data 1968-1970, unpublished (not to be included in total)
b Statistics Canada, Financial Management Series, Historical Revision, 1968-1970, unpublished
c Statistics Canada, Financial Management Series (Cataglogue No. 68-205) unpublished

Totals may not add due to rounding
Source: Statistics Canada (Catalogue No. 68-207, 1969-76)

TABLE 8
GROSS GENERAL REVENUE*
GROSS GENERAL EXPENDITURE
FISCAL YEAR ENDING MAR 31,
ONTARIO

Source	1968[b]	1969[b]	1970[b]	1971	1972	1973	1974	1975	1976	1977	1978[c]
					(thousands of dollars)						
Taxes											
Personal Income Tax	551004	620476	762086	991815	1002058	1204828	1417495	1750790	1962470	2200175	3434900
Corporation Income Taxes	276577	304679	441038	357026	372287	447915	528511	742305	970437	785478	1038400
Real Property Taxes	1762	1755	2034	1932	2014	1948	2202	2166	2202	2187	N/A
General Sales Tax	442417	493087	645284	683089	768831	895258	1314814	1568829	1334175	1787261	1749900
Motive Fuel Taxes	307134	366182	394585	412091	439119	486685	547171	571644	578036	587019	630000
Other	460693	581848	838499	1005493	1007729	1002370	1112458	1240411	1358520	1815118	2590600
Total, Taxes	2039587	2368027	3083526	3451446	3592038	4039004	4922651	5876145	6205840	7177238	9443800
Natural Resource Revenue[a]											
Forests	18482	19695	21978	22858	15297	16031	17075	22458	27687	32047	N/A
Mines	17557	20679	25592	26537	14822	18327	48219	154190	64524	42956	N/A
Oil & Gas	226	691	611	533	525	616	803	881	684	615	N/A
Water Power	8999	9088	10077	9296	10283	11405	12138	13874	14171	14952	N/A
Other	9667	12046	15781	14741	14427	16602	18387	19180	20168	20015	N/A
Total, Natural Resource Revenue	54931	62199	74039	73966	55354	62981	96621	210584	127233	110585	117200
Total, Privileges, Licenses & Permits	202603	256910	283342	209986	226493	273050	288387	304761	354557	365794	468800
Total, Sales of Goods & Services	43188	64894	87894	104126	125993	169973	184265	175767	219187	250064	302100
Total, Return on Investments	227123	304415	348077	423872	497169	519398	614642	749113	873493	1032470	1231900
Other	26325	46605	53197	54314	58913	67510	71878	85978	112443	120715	
Total Gross General Revenue From Other Sources	2538826	3040851	3356036	4317709	4555960	5131916	6178445	7402348	7892753	9056866	11696600

Table 8
Gross General Revenue
Gross General Expenditure
Fiscal Year Ending Mar 31,
Ontario
(Continued)

	1968[b]	1969[b]	1970[b]	1971	1972	1973	1974	1975	1976	1977	1978[c]
					(thousands of dollars)						
General Purpose Transfers from other levels of Government & their enterprise											
Equalization	-	-	-	-	-	-	-	-	-	-	-
Tax Revenue Guarantee	-	-	-	-	-	-	-	-	255499	495513	28800
Share of Oil Export Tax	-	-	-	-	-	-	-	-	-	-	-
Other	26828	31764	40237	43582	40788	50283	20513	70613	16993	13024	-36500
Total General Purpose Transfers	26828	31764	40237	43582	40788	50283	20513	70613	272492	508537	-7700
Total Specific Purpose Transfer	500723	588224	707691	919686	1059634	1177447	1195713	1452119	1856331	2150213	2313500
Gross General Revenue	3066377	3660839	4603964	5280978	5656382	6359645	7394671	8925080	10021576	11715616	14002400
Gross General Expenditure	3086660	3709591	4386466	5307941	6162408	6704063	7716219	9655071	11461247	12741103	15007000
Surplus (Deficit)	(20283)	(48752)	217498	(26963)	(506026)	(344418)	(321548)	(72991)	(1439671)	(1025487)	(1004600)

* Financial Management Statistics

a Statistics Canada, Preliminary Revised Data, 1968-1970, unpublished (not to be counted in total)

b Statistics Canada, Financial Management Series, Historical Revision for 68-207, unpublished

c Statistics Canada, Financial Management Series (Catalogue No. 68-205) unpublished

Totals may not add due to rounding
Source: Statistics Canada (68-207, 1969 - 76)

TABLE 9
GROSS GENERAL REVENUE*
GROSS GENERAL EXPENDITURE
FISCAL YEAR ENDING MAR 31,
ALBERTA

Source	1968[b]	1969[b]	1970[b]	1971	1972	1973	1974	1975	1976	1977	1978[c]
					(thousands of dollars)						
Taxes											
Personal Income Tax	79792	98334	134042	181807	192031	232018	281747	347386	352022	439265	605600
Corporation Income Tax	39932	49858	63967	57949	68090	97652	114759	275565	269625	384487	382500
Real Property Taxes	-	-	-	-	-	-	-	-	-	-	N/A
General Sales Tax	-	-	-	-	-	-	-	-	-	-	N/A
Motive Fuel Taxes	50730	69979	80367	79354	85411	91974	102624	80277	83502	91356	9100
Other	25335	41833	91488	101649	104481	105805	118818	140634	178436	216093	275200
Total, Taxes	195789	260004	369864	420759	450013	527449	617948	843862	883585	1131201	1272400
Natural Resource Revenue[a]											
Forests	3450	3548	4384	4374	4923	9581	12585	9877	5250	4878	N/A
Mines	445	665	677	1644	2518	2742	4160	4158	5324	10491	N/A
Oil & Gas	221491	287144	258747	234632	274196	332884	586828	1386549	1768219	2190626	N/A
Water Power	221	163	221	195	209	526	292	368	212	529	N/A
Other	4820	5670	5447	5769	5766	6146	5767	5908	5929	7253	N/A
Total Natural Resource Revenue	230427	297190	269481	246614	287612	351878	609632	1406859	1784935	2213777	3658700
Total, Privileges, Licenses & Permits	254161	322870	299173	33546	35833	39698	44191	47814	53526	62212	81000
Total Sales of Goods & Services	16636	25223	27902	32164	33163	38211	40923	47541	59168	71699	101200
Total, Return on Investments	69676	108925	124232	140672	158654	167708	196974	263494	345838	477839	768500
Other	23577	17060	21419	23843	25817	33444	88023	61531	85758	86833	93900
Total Gross General Revenue From Other Sources	559839	734082	842590	897598	991092	158388	1597692	2671101	3212809	4043561	5975700

Table 9
Gross General Revenue
Gross General Expenditure
Fiscal Year Ending Mar 31,
Alberta
(Continued)

Source	1968[b]	1969[b]	1970[b]	1971	1972	1973	1974	1975	1976	1977	1978[c]
					(thousands of dollars)						
General Purpose Transfers from other levels of Government & their enterprise											
Equalization	-	-	187	-	-	-	-286	-	-	-	-
Tax Revenue Guarantee	-	-	-	-	-	-	-	-	42049	73263	7200
Share of Oil Export Tax	-	-	-	-	-	-	-	-	175	-	-
Other	14205	17256	17369	16107	16846	22945	79620	213985	21528	32485	38800
Total General Purpose Transfers	14205	17256	17553	16107	16846	22945	79337	213985	63752	105748	46000
Total Specific Purpose Transfers	130996	15110	200196	225438	277283	272610	311032	337956	436798	509371	607400
Gross General Revenue*	705040	902448	1060339	1139143	1285221	1453943	1988057	3223043	3713360	4658680	6629100
Gross General Expenditure	798893	902690	1069527	1232826	1416138	1478257	1742620	2363448	3004747	3716229	5131100
Surplus (Deficit)*	(93853)	(242)	(9188)	(93683)	(130197)	(24314)	245437	859595	708613	942451	1498000

* Financial Management Statistics
a Statistics Canada, Preliminary Revised Data, 1968-1970, unpublished
(not to be counted in total)
b Statistics Canada, Financial Management Series, Historical Revision for 68-207, unpublished
c Statistics Canada, Financial Management Series (Catalogue No. 68-205) unpublished

Totals may not add due to rounding
Source: Statistics Canada (68-207, 1969 to 1976)

TABLE 10
NET SOURCES AND USES OF FUNDS FOR FISCAL YEAR ENDING MAR 31*
CANADA

	1968 N/A	1969 N/A	1970	1971	1972	1973	1974	1975	1976	1977**
					(millions of dollars)					
Surplus or Deficit			14.1	189.2	(517.4)	(147.5)	433.9	381.6	(1681.6)	(381.6)
Receivables or Payables			12.7	8.0	(99.5)	54.6	104.1	63.6	672.5	(705.4)
Loans and Advances			(476.8)	(69.0)	(9.4)	(40)	(192.5)	4.4	(205.2)	(543.4)
Treasury Bills			(53.3)	(50.0)	259.2	53.6	(78.1)	(65.0)	274.2	(449.5)
Bonds - Debentures Obligations	-	-	1327.1	-	-	-	-	-	-	-
Canada Pension Plan			N/A	752.2	794.3	897.9	958.5	1191.5	1419.7	1454.6
Saving Bonds			N/A	32.0	115.8	72.3	(23.9)	(27.2)	262.3	149.8
Other			N/A	102.4	128.6	408.1	101.8	97.5	371.6	892.2
Other			(815.9)	(590.8)	(525.0)	(764.4)	(892.9)	(1077.9)	(1195.3)	202.1
Total			7.9	374.0	146.6	534.7	410.9	605.2	(81.9)	214.5

* The surplus (deficit) figure in Table 10 differs from Table 7 since the former surplus (deficit) is net of recoveries and refunds from prior years.
** Preliminary Estimates: Statistics Canada (Catalogue No. 68-209, 1976)

Source: Statistics Canada (Catalogue No. 68-209, 1970-1976)

TABLE 11
NET SOURCES AND USES OF FUNDS FOR FISCAL YEAR ENDING MAR 31*
ONTARIO

	1968 N/A	1969 N/A	1970	1971	1972	1973	1974	1975	1976	1977**
						(millions of dollars)				
Surplus or (Deficit)			155.4	(20.5)	(499.6)	(336.3)	(308.2)	(719.2)	(1388.2)	(965.4)
Receivables or Payables			(3.7)	11.8	.413	12.9	(8.8)	1.2	(20.2)	(26.2)
Loans and Advances			(302.2)	(111.5)	(61.7)	78.6	(193.8)	66.6	(46.1)	(61.8)
Treasury Bills			(8.9)	2.4	90.00	61.9	(172.7)	(79.2)	325.0	(195)
Bonds - Debentures Obligations			350.0	-	-	-	-	-	-	-
1) Canada Pension Plan			N/A	476.0	498.3	536.4	607.0	701.8	784.0	812.8
2) Saving Bonds			N/A	-	-	-	-	-	-	-
3) Other			N/A	(247.1)	(21.0)	101.7	115.3	17.7	472.9	609.9
Other			(182.6)	(61.0)	(101.4)	(198.9)	(90.0)	(33.4)	(69.9)	154.9
Total			8.0	50.2	5.1	255.0	(51.7)	(44.5)	57.5	28.6

* The surplus (deficit) figure in Table 11 differs from Table 8 since the former surplus (deficit) is net of recoveries and refunds from prior years.
** Preliminary Estimates: Statistics Canada (Catalogue No. 68-209, 1976)

Source: Statistics Canada (Catalogue No. 68-209, 1970-1976)

TABLE 12
NET SOURCES AND USES OF FUNDS FOR FISCAL YEAR ENDING MAR 31*

	1968 N/A	1969 N/A	1970	1971	1972	1973	1974	1975	1976	1977**
					(millions of dollars)					
Surplus or Deficit			(18.4)	(92.3)	(129.7)	(23.3)	248.3	862.6	707.6	924.4
Receivables or Payables			(5.1)	(.87)	16.0	(10.7)	15.8	51.5	9.0	(83.7)
Loans and Advances			(7.8)	(2.6)	3.3	(21.8)	29.2	(93.7)	114.6	240.5
Treasury Bills			-	(.326)	(.484)	(.492)	99.3	(.036)	54.9	(151.8)
Bonds - Debentures										
Obligations			(11.8)	-	-	-	-	-	-	-
1) Canada Pension Plan			N/A	82.3	87.1	94.6	108.2	126.6	143.4	150.7
2) Saving Bonds			N/A	-	(.036)	-	.036	-	-	-
3) Other			N/A	34.8	13.4	(18.7)	(171.7)	(248.1)	(702.9)	(1242.8)
Other			42.8	5.1	6.7	57.7	(149.0)	(116.3)	(288.0)	69.7
Total			(.315)	18.3	(3.8)	77.3	180.2	582.6	(300.5)	(92.9)

* The surplus (deficit) figure in Table 12 differs from Table 9 since the former surplus (deficit) is net of recoveries and refunds form prior years.
** Preliminary Estimates: Statistics Canada (Catalogue No. 68-209, 1976)

Source: Statistics Canada (Catalogue No. 68-209, 1970-1976)

TABLE 13
NATURAL GAS

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977[a]	COMPOUND GROWTH RATE 1968-1977	1973-1977
	(millions cu. ft. - pi^3)											
PRODUCTION												
Saskatchewan	65560.3	67374.5	78021.3	84607.8	83876.6	74257.0	69384.0	67858.0	65721.0	56812.0	-1.58	-6.48
Alberta	1235691.7	1432174.6	1665550.3	1839385.0	2050977.0	2178783.0	2180680.0	2232590.0	2270561.0	3405711.0	7.68	2.51
B.C. Yukon, N.W.T.	265449.8	308523.7	331985.5	338582.4	411904.0	465172.0	399988.0	388020.0	375810.0	380091.0	4.07	-4.92
Other	12316.4	11576.5	17360.9	16535.0	12583.7	9806.0	7898.0	11076.0	5067.0	8612.0	-3.90	-3.19
TOTAL	1579018.2	1824649.3	2092918.0	2279110.2	2559341.3	2728018.0	2657860.6	2699544.0	2717209.0	2851226.0	6.79	1.11
EXPORTS												
TOTAL	604445.2	680109.4	779497.3	910778.3	1009404.1	1027310.0	959187.0	946848.0	953570.0	999715.0	5.75	-0.68
IMPORTS												
TOTAL	81554.1	34935.6	10860.0	14348.8	15693.3	14824.0	13408.0	10220.0	4051.0	29.0	-28.37	-49.99
STOCK CHANGE	4779.5	4897.8	27124.5	-3026.0	8637.1	58417.0	36897.0	56979.0	23106.0	36193.0	61.74	-11.28
OTHER	490.8	883.3	1442.6	355.4	2038.9	846.0	769.0	595.0	978.0	2751.0	21.11	34.29
AVAILABILITY												
Ontario	339237.5	385335.6	445152.5	500099.7	595099.0	618379.0	685421.0	670712.0	545874.0	691567.0	8.24	2.84
Alberta	356978.0	398372.0	432339.7	456178.7	504924.5	534629.0	509061.0	546590.0	715981.0	632213.0	6.56	4.28
Other	355622.6	391753.4	421106.6	429783.7	459008.7	504953.0	481471.0	489230.0	483707.0	494318.0	3.73	-0.53
Total	1051838.3	1175461.0	1298598.8	1386062.1	1559032.2	1657961.0	1675953.0	1706532.0	1745562.0	1818098.0	6.27	2.33
EXPORTS AS A % OF PROD.	38.28	37.27	37.24	39.96	39.44	37.66	36.09	35.07	35.09	35.06	-0.97	-1.77
IMPORTS AS A % OF AVAIL.	7.75	2.97	0.84	1.04	1.04	0.89	0.80	0.60	0.23	0.002	-60.07	-28.23

(a) Statistics Canada - Catalogue No. 57-207, preliminary estimates, unpublished

Source: Statistics Canada (Catalogue No. 57-505, 1968-69; 57-207, 1970-76; 26-213, 1968-1976)

TABLE 14
CRUDE OIL

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977[a]	Compound Growth Rates 68-77	73-77
	(millions of barrels of 35 Canadian gallons)											
PRODUCTION												
Sask.	92.2	87.8	89.9	88.9	87.0	86.2	74.1	59.4	56.2	61.6	-4.38	-8.06
Alta.	288.3	326.4	380.3	416.0	502.6	601.1	572.6	495.5	450.9	447.2	5.00	-5.61
B.C., Yukon, N.W.T.	23.9	27.1	27.3	27.3	25.8	23.4	21.0	16.6	17.0	16.0	-4.36	-9.07
Other	7.4	7.4	7	6.5	6.2	5.9	5.6	5.0	4.6	4.6	-5.15	-6.03
Total	411.8	448.7	504.5	538.7	621.6	716.6	673.3	576.5	528.7	529.4	2.83	-3.31
EXPORTS												
Total	169.2	202.7	244.5	272.8	348.4	414.4	330.6	256.1	172.8	119.4	-3.80	-26.74
IMPORTS												
Total	178.4	190.5	208.4	244.2	288.8	314.1	299.3	300.5	264.0	244.3	3.55	-6.09
STOCK CHANGE	5.3	2.9	1.1	.6	2.3	.045	-.3	-.9	3.8	-1.1	-	-
OTHER	-	-	-	-	-	-	-	-	-			
AVAILABILITY												
Ont.	120.5	124.8	135.3	135.9	137.9	149.5	165.6	161.8	165.4	183.3	4.77	5.23
Alta.	38.3	41.0	41.6	47.6	54.2	63.0	61.5	74.4	78.4	90.6	10.04	9.51
Other	256.9	267.9	290.4	326.1	367.5	403.6	415.2	385.6	373.2	381.4	4.49	-1.40
Total	415.7	433.7	467.3	509.6	559.6	616.1	642.3	621.8	616.0	655.3	5.19	1.55
EXPORTS AS A % OF PROD.	41.09	45.18	48.46	50.64	56.05	57.83	49.10	44.42	32.68	22.55	-6.45	-20.98
IMPORTS AS A % OF AVAIL.	42.92	43.92	44.60	47.92	51.61	50.98	46.60	48.33	42.86	37.28	-1.55	-3.42

(a) Statistics Canada - Catalogue No. 57-207, preliminary estimates, unpublished

Source: Statistics Canada (Catalogue No. 57-505, 1968-69; 57-207, 1970-76; 26-213, 1968-1976)

TABLE 15a
TAX BASES, 1976

TAX BASES	UNITS	ONT.	ALTA.	10 PROV	10 PROV - ONT.	10 PROV - ALTA.	10 PROV - (ONT & ALTA)
				(in thousands)			
Assessed Federal Individual Income Tax (Basic Tax)	$	6,920,390	1,584,543	17,127,577	10,207,187	15,543,034	8,622,644
Allocated Corporate Taxable Income	$	5,930,593	2,086,142	14,606,186	8,675,593	12,520,044	6,589,451
Value of Sales by Retail Establishment	$	27,428,412	8,353,561	74,442,086	47,013,674	66,088,525	38,660,113
Motive Fuel Sales	gals.	2,949,432,481	796,264,995	807,070,315	5,121,270,634	7,274,438,120	4,325,005,639
Sales of Alcoholic Beverages	gals.	22,651,690	5,941,387	59,673,943	37,022,253	53,732,556	31,080,866
Total Personal and Corporate Income	$	150,036,079	42,903,526	374,410,250	224,374,171	331,506,724	181,470,645

*Source: Ministry of Finance

TABLE 15b
REVENUES BY PROVINCE
FISCAL YEAR 1976 - 77

SOURCE	NFLD.	P.E.I.	N.S.	N.B.	QUE.	ONT.	MAN.	SASK.	ALTA.	B.C.	TOTAL	10 PROV - ALTA	10 PROV - ONT	10 PROV - (ONT + ALTA)
							(in thousands)							
Personal Income Tax	107,815	17,242	172,551	146,494	3,279,519	2,200,175	291,314	277,097	439,265	725,316	7,656,788	7,217,523	5,456,613	5,017,345
Corporate Income Tax	26,662	3,548	49,700	30,813	465,001	785,480	111,858	91,501	384,487	214,601	2,163,651	1,779,164	1,378,171	993,684
General and Miscellaneous Sales Tax	151,827	22,116	152,288	121,909	1,640,238	1,944,636	214,208	184,955	17,488	715,781	5,165,446	5,147,958	3,220,810	3,203,322
Motive Fuel Taxes (Gross)	37,665	8,405	57,890	49,582	428,450	587,091	72,619	59,983	91,356	178,517	1,571,558	1,480,202	984,467	893,111
Alcoholic Beverages	33,719	7,510	54,681	36,402	219,551	386,908	64,353	59,692	115,700	163,200	1,141,716	1,026,016	754,808	639,108
Provincial taxes (other) + Miscellaneous Provincial	31,255	15,430	24,302	66,107	694,895	612,196	66,083	101,122	112,817	317,963	2,042,170	1,929,353	1,429,974	1,317,157

*Source: Ministry of Finance

TABLE 15c
EFFECTIVE TAX RATES*

	ONT.	ALTA.	10 PROV	10 PROV - ALTA	10 PROV - ONT
Personal Income Tax/Assessed Federal Individual Income Tax (Basic Tax)	.3179264463	.2772187312	.447044436	.4643574092	.5345853858
Corporate Income Tax/Allocated Corporation Taxable Income	.1324454401	.184305287	.1481325104	.1421052514	.1588561151
General & Miscellaneous Sales Tax/Value of Sales by Retail Establishment	.0708985996	.0020934785	.069388763	.0778948842	.0685079409
Motive Fuel Taxes/Motive Fuel Sales	.0001990522	.0001147306	.0001947238	.0002034799	.000192231
Alcoholic Beverages/Sales of Alcoholic Beverages	.0170807564	.0194735674	.0191325718	.0190948668	.0203879542
Provincial Taxes (other) & Miscellaneous Provincial Revenue/Total Personal & Corporate Income	.0040803252	.0026295508	.0054543646	.0058199513	.0063731667

*Derived from Tables 1 and 2

TABLE 15d
HYPOTHETICAL REVENUES*

SOURCE	ALTA BASE X (ONT. E.T.R.)	ACTUAL	DIFFERENCE
		(in thousands)	
Personal Income Tax	503,768.13	439,265	64,503.13
Corporate Income Tax	276,300.00	384,487	-108,187.00
General and Miscellaneous Sales Tax	592,255.78	17,488	574,767.78
Motive Fuel Taxes (Gross)	158,498.30	91,356	67,142.30
Alcoholic Beverages	101,483.38	115,700	-14,216.62
Provincial Taxes (other) & Miscellaneous Provincial Revenue	175,060.34	112,817	62,243.34
Totals	1,807,365.93	1,161,113	646,252.93

*Alta base (Ont. E.T.R.) - Actual Alta. Revenue = Difference.

Source: Derived from Tables 1, 2 3

TABLE 15e
HYPOTHETICAL REVENUES*

SOURCE	ONT BASE X (ALTA E.T.R.)	ACTUAL	DIFFERENCE
	(in thousands)		
Personal Income Tax	1,918,461.74	2,200,175	-281,713.26
Corporate Income Tax	1,093,039.65	785,480	307,559.65
General and Miscellaneous Sales Tax	57,420.79	1,944,636	-1,887,215.21
Motive Fuel Taxes (Gross)	338,390.16	587,091	-248,700.84
Alcoholic Beverages	441,109.21	386,108	55,001.21
Provincial Taxes (other) & Miscellaneous Provincial Revenue	394,527.49	612,196	-217,668.51
Totals	4,242,949.04	6,516,486	-2,273,536.96

* Ont base (ALTA. E.T.R.) - Actual Ont. Revenue = Difference.

Source: Derived from Tables 1, 2 3

TABLE 15f
HYPOTHETICAL REVENUES*

SOURCE	ALTA BASE X (10 Less Alta. E.T.R.)	ACTUAL	DIFFERENCE
	(in thousands)		
Personal Income Tax	735,794.28	439,265	296,529.28
Corporate Income Tax	296,451.73	384,487	-88,035.27
General and Miscellaneous Sales Tax	650,699.67	17,488	633,211.67
Motive Fuel Taxes (Gross)	162,023.92	91,356	70,667.92
Alcoholic Beverages	113,449.99	115,700	-2,250.01
Provincial Taxes (other) & Miscellaneous Provincial Revenue	249,696.43	112,817	136,879.43
Totals	2,208,116.02	1,161,113	1,047,003.02

*Alta base (10 Less Alta. E.T.R.) - Actual Alta. Revenue = Difference.

Source: Derived from Tables 1, 2 3

TABLE 15g
HYPOTHETICAL REVENUES*

SOURCE	ONT BASE (10 LESS ONT E.T.R.)	ACTUAL	DIFFERENCE
	(in thousands)		
Personal Income Tax	3,699,539.36	2,200,175	1,499,364.36
Corporate Income Tax	942,110.96	785,480	156,630.96
General and Miscellaneous Sales Tax	1,879,064.03	1,944,636	-65,571.97
Motive Fuel Taxes (Gross)	566,972.36	587,091	-20,118.64
Alcoholic Beverages	461,821.62	386,908	74,913.62
Provincial Taxes (other) & Miscellaneous Provincial Revenue	956,204.94	612,196	344,008.94
Totals	8,505,713.27	6,516,486	1,989,227.27

* Ont base (10 Less Ont. E.T.R.) - Actual Ont. Revenue = Difference.

Source: Derived from Tables 1, 2 3

TABLE 16a
ALBERTA HERITAGE SAVINGS TRUST FUND
BALANCE SHEET
FISCAL YEARS ENDING MARCH 31,
(thousands of dollars)

	1979	%Change From Previous Year	1978	%Change From Previous Year	1977
ASSETS					
Current					
Deposit in the Consolidated Cash Investment Trust Fund of the Province of Alberta	29253	-84.0	182790	805.4	201889
Accounts Receivable	-	-	-	-	3586
Accrued Interest Receivables	123280	48.2	83185	46.7	56685
Marketable Securities at Aggregate Cost or Market Value, whichever is lower	2413924	31.7	1833242	57.2	1166261
	2566457	22.3	2099217	47.0	1428421
Capital Projects Division Investments, at cost	255089	107.7	122797.	241.5	35961
Canada Investment Division Investments at cost	269519	179.9	96295.	94.5	49502
Alberta Investment Division Investments at cost, including interest capitalized and to be capitalized	1614347	52.9	1055799	50.1	703631
	4705412	39.5	3374108	52.2	2217515
LIABILITIES AND FUND EQUITY					
CURRENT					
Accounts Payable	20208	-51.4	41600.	331.4	9644
FUND EQUITY:					
Transfers from the General Revenue Fund of the Province of Alberta	4110227	34.7	3051225.	43.9	2120182
Retained Earnings	574977	104.4	281283	220.8	87689
	4685204	40.6	3332508	50.9	2207871
	4705412	39.5	3374108	52.2	2217515

Source: ALBERTA HERITAGE SAVINGS TRUST FUND: ANNUAL REPORTS 1976-1977, 1977-1978; 1978-1979; Quarterly Investment Reports, ending Mar. 31, 1979

TABLE 16b
STATEMENT OF CHANGES IN FINANCIAL POSITION
FISCAL YEARS ENDING MARCH 31,
(thousands of dollars)

	1979	%Change From Previous Year	1978	%Change From Previous Year	1977
Net Income for the period	293694	51.7	193594	120.8	87689
Less: adjustments for amortization of discount on Canada Investment Division Investments..........	74	164.3	28	1300.0	2
	293620	51.7	193566	120.7	87687
*Transfers from the General Revenue Fund..........	1059002	13.7	931043	-56.1	2120182
	1352622	20.3	1124609	-49.1	2207869
FUNDS were applied to:					
Capital Projects Division investment..........	132292	52.3	86836	141.5	35961
Capital Investment Division Investments..........	173150	270.3	46765	-5.5	49500
Alberta Investment Division Investments..........	558548	58.6	352168	-49.9	703631
	863990	77.9	485769	-38.4	789092
Increase In Working Capital	488632	-23.5	638840	-55.0	1418777
Represented by:					
Increase in current assets..........	467240	-30.3	670796	-53.0	1428421
Less: Decrease in current liabilities.......... (Increase)	21392	166.9	(31956)	231.4	(9644)
	488632	-23.5	638840	-55.0	1418777

Includes prior period adjustment
Source: Alberta Heritage Savings Trust fund: Annual Reports 1976-1977, 1977-1978, 1978-1979; Quarterly Investment Reports ending Mar 31, 1979

TABLE 16c
MARKETABLE SECURITIES
FISCAL YEARS ENDING MARCH 31,
(thousands of dollars)

	1979	% Change From Previous Year	1978	% Change From Previous Year	1977
Short-term investments	611260	30.4	468600	110.6	222500
Bonds and Debentures,					
Government of Canada direct and guaranteed	153500	198.6	51400	655.9	6800
Alberta Government Telephones Commission	9433	.4	9400	-	509500
Corporate	18223	-8.9	20000	-13.0	23000
Other Provinces, direct and guaranteed	82397	25.0	65900	57.7	41800
Total At Cost	874813	42.2	615100	-23.5	803600
Total at Market Value	861054	40.4	613400	-25.0	817740
Long Term Investments:					
Alberta Municipal Financing Corporation	744168	36.3	545800	50.5	362700
Alberta Government Telephones Commission	808702	20.0	674000	-	
Total at Cost	1552870	27.3	1219800	236.3	362700
	2413924	31.7	1833200	57.2	1166300

Due to a change in accounting policy there is no figure for 1977-Long Term Investments, Alberta Government Telephones Commission

Source: ALBERTA HERITAGE SAVINGS TRUST FUND: ANNUAL REPORTS 1976-1977, 1977-1978, 1978-1979; Quarterly Investment Reports, ending Mar 31, 1979

TABLE 16d
CAPITAL PROJECTS DIVISION INVESTMENT
FISCAL YEAR ENDING MARCH 31,
(thousands of dollars)

	1979	% Change From Previous Year	1978	% Change From Previous Year	1977
Health Care Facilities and Applied Research	73970	203.7	24,356	318.6	5819
Irrigation Rehabilitation and Expansion	28762	71.2	16805	231.2	5074
Renewable Resources Improvement	17494	62.6	10758	815.6	1175
Development of Oil Sands Technology	62949	116.3	29099	206.4	9497
Establishing and Improving Recreational Facilities	66484	59.1	41779	190.2	14396
Other (new airport facilities etc.)	5430	-	-	-	-
TOTAL	255089	107.7	122797	241.5	35961

Source: ALBERTA HERITAGE SAVINGS TRUST FUND: ANNUAL REPORTS 1976-1977, 1977-1978, 1978-1979; Quarterly Investment Reports, ending Mar. 31, 1979

TABLE 16e
ALBERTA INVESTMENT DIVISION INVESTMENTS
FISCAL YEAR ENDING MARCH 31,
(thousands of dollars)

	1979	%Change From Previous Year	1978	%Change From Previous Year	1977
Alberta Housing Corporation Debentures	311894	24.9	249729	61.1	155015
Alberta Home Mortgage Corporation Debentures	555195	59.7	347709	53.0	227238
Alberta Energy Company Ltd. Shares	75762	00.2	75650	0.1	75475
Equity in Syncrude Project	225857	26.0	179301	49.2	120215
Gulf Canada Limited: 8 1/8% convertible debenture at cost + interest capitalized	118537	10.9	106847	61.3	66236
Canada - Cities Services Ltd.: 8 3/8% convertible debenture at cost + interest capitalized	117602	21.8	96563	62.4	59453
Alberta Argicultural Development Corporation	138000	-	-	-	-
TOTAL	1614347	52.90	1055799.0	50.05	703632

Source: ALBERTA HERITAGE SAVINGS TRUST FUND: ANNUAL REPORTS
1976-1977, 1977-1978, 1978-1979: Quarterly Investment Reports,
ending Mar. 31, 1979

TABLE 16f
CANADA INVESTMENT DIVISION INVESTMENTS
FISCAL YEAR ENDING MARCH 31,
(thousands of dollars)

	1979	% Change From Previous Year	1978	% Change From Previous Year	1977
Debenture Issued by:					
Province of Manitoba	74565	-	-	-	-
Province of New Brunswick	46781	00.03	46769	-	
Province of Newfoundland	49549	00.05	49526	0.05	49502
Province of Nova Scotia	49312	-	-	-	-
Nova Scotia Power Corp.	49312	-	-	-	-
TOTAL	269519	179.89	96295	94.53	49502

Source: ALBERTA HERITAGE SAVINGS TRUST FUND: ANNUAL REPORTS
1976-1977, 1977-1978, 1978-1979; Quarterly Investment Reports, ending
ending Mar. 31, 1979

WOOD GUNDY

Circulation Paper for the Ontario Economic Council's Energy Conference
September 27-28, 1979
held at the Four Seasons Hotel Yorkville, Toronto

Financial Intermediation and its Implications for the Recycling Problem

by

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Introduction

After discussion with members of the Ontario Economic Council, the scope of this paper is limited to the Canadian capital market and the perceived financial recycling problem pursuant to emergent developments in the energy business in Canada. The viewpoint of the writer is from the financial market trenches of a fully integrated Canadian investment dealer, Wood Gundy Limited.

Summary and Conclusion

There is no recycling problem at the present time. It is highly unlikely that there will be a recycling problem in the meaningful future.

Orders of Magnitude

Table 1, "Gross Financing by Selected Canadian Borrowers," is a proxy for the demand side of the Canadian capital market. Table 2, "The Canadian Money Market," presents an order of magnitude for the money market. Table 3, "Institutional Lending Structure of the Canadian Capital Market," is a proxy for the supply side of the Canadian capital market. Table 4, "Secondary Trading Activity in the Canadian Bond and Money Market," reflects the volume of activity in the secondary fixed-income markets in Canada. Table 5, "Secondary Trading Activity in the Canadian Equity Market," reflects the volume of activity in the secondary equity markets in Canada.

General

In general, the institutional and corporate sector of the Canadian capital market is professionally managed. All available funds are, therefore, continuously invested. To the extent that funds are not fully invested from time to time, the cause would normally be accounting mishaps that failed to identify the availability of funds.

Members of the Investment Dealers Association of Canada account for almost the total activity in the secondary market-making function. To smooth out discrepancies between inflows and outflows of funds from the institutional sector, investment dealers have daylight or intra-day overdraft facilities with Canadian banks. These facilities act as a surge tank during each business day as the institutional sector works towards a flat or zero funds position by the close of business each day.

Given the manner in which the Canadian capital market works on a day-to-day basis, it would seem that the recycling question is probably a non-question -- at least in concept. From a practical or operational point of view, there would appear to be three questions worthy of consideration. First, what happens if particular elements become too large for the system? Second, do rigidities emerge if key major lenders have restricted approved investment lists? And, third, does the emergence of major lenders restrain the financial intermediation process? It might be useful to examine these questions in the context of specific major lenders wherever possible. Two are selected -- the Alberta Heritage Savings Trust Fund and the Caisse de dépôt et placements du Québec.

The Question of Size

From an asset point of view and keeping the numbers round, both the Caisse de dépôt and the Alberta Heritage Fund increased their assets by about $1.5 billion in 1978. These amounts relate to the $50 billion in gross financing in 1978 (Table 1), the increase in size of the Canadian money market by $15 billion in 1978 (Table 2) and the increase in the institutional lending sector by $43 billion in 1978 (Table 3).

From a cash flow point of view, both new funds and proceeds of past investments, a useful perspective can be attained by examining transaction volume statistics. There are approximately 250 meaningful business days in each year. The daily average investment of new funds by both the Caisse and the Heritage Fund is, therefore, about $6 million. This magnitude relates to the daily average turnover in the various markets handled by members of the IDA and the stock exchanges of $932 million in 1978 (Tables 4 and 5). In addition, there could easily be almost that volume being handled by the banks and near banks directly in the primary fixed-deposit markets.

In the event that there is lumpiness in the receipt of funds either new

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or from proceeds of past investments, professionally managed institutions phase the term structure of their portfolios to smooth out discontinuities.

When you relate the size of particular institutions to the markets in which they operate, it is difficult not to conclude that the question of disproportionate size or dominance is not evident at the present time nor is it likely to become a problem in the future, given the pattern of growth and historical efficiency of the Canadian capital market. This judgment is confirmed by market experience.

The Question of Approved List Rigidities

Each lending institution generates investment policies consistent with the objectives of the particular organization. From an operational point of view, these policies show up as portfolio balance questions among various security categories -- broadly speaking -- equity, bonds and mortgages. Within each of these categories a list of specific approved investments is determined. It is normally and properly the case that the "approved list" is privy to the particular institution.

Should a particular institution generate excess demand, in relation to available supply, for a particular set of securities determined by that institution's approved list -- do rigidities develop? Both experience and price theory tell us that potential rigidities are resolved by price adjustments.

The structure of financial asset prices is a function of relative creditworthiness, expected rates of return, supply, demand, and general market expectations about such things as inflation, economic growth, the political climate and so on. At a point in time, the foregoing factors generate a panoply of relative values. Operationally, these relative values are called yield spreads in the fixed-income markets and buy/sell opportunities in the equity market. The daily bread and butter of security traders in performing their market-making function is buying and selling relevant securities to sustain the relative value relationships. In the context of the question of rigidities, therefore, what happens when excess demand for one set of securities emerges is that the relative value of that set gets distorted. The distortion creates a multitude of trading or swap opportunities which generate the required supply to meet the excess demand. The many hundreds of over-the-counter traders in the fixed-income markets and the professional traders on the floors of the stock exchanges spend all their working hours performing this function.

In effect, the price system resolves any questions of approved list rigidities.

The Question of Financial Intermediation Restraint

This question normally is raised in the context of do the "bigs" support the "smalls"? In Canada, the major financing sources for small business are the chartered banks, the Federal Business Development Bank and the Export Development Corporation. The assets of the latter two corporations are assets of Her Majesty in Right of Canada. Their liabilities, therefore, represent a claim on the Consolidated Revenue Fund of Canada. Operationally we know of no major Canadian lender that does not have chartered banks or the Government of Canada on their approved lists as revealed by their published balance sheets. In effect, the emergence of new major lenders accelerates the intermediation process.

Table 1

GROSS FINANCING BY SELECTED CANADIAN BORROWERS
($ million)

Government Sector	1975	%	1976	%	1977	%	1978	%	1st half 1978	%	1st half 1979	%
CANADA	6,129	19.7	6,137	17.3	8,562	20.2	15,560	30.8	3,673	18.3	4,917	25.7
Provinces	7,963	25.6	10,085	28.5	8,453	20.0	8,226	16.3	4,560	22.7	4,687	24.5
Municipalities	1,415	4.6	1,596	4.5	1,540	3.6	1,038	2.1	521	2.6	563	2.9
Total Governments	15,507	49.9	17,818	50.3	18,555	43.8	24,824	49.1	8,754	43.6	10,167	53.2
Corporate Sector												
Debt	4,027	13.0	5,400	15.3	5,960	14.1	5,289	10.5	2,729	13.6	2,328	12.2
Equity	1,310	4.2	1,346	3.8	2,829	6.7	6,287	12.4	2,032	10.1	1,717	9.0
Total Corporate	5,337	17.2	6,746	19.1	8,789	20.8	11,576	22.9	4,761	23.7	4,047	21.2
Mortgage Sector												
Residential Mortgage	10,206	32.9	10,840	30.6	14,973	35.4	14,121	28.0	6,574	32.7	4,898*	25.6
GRAND TOTAL	31,050	100.0	35,404	100.0	42,317	100.0	50,521	100.0	20,089	100.0	19,110	100.0

*Wood Gundy estimate

Source: Bank of Canada Review

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Table 2

CANADIAN MONEY MARKET
BY ASSET CATEGORY

(in millions of Canadian dollars)

	May 1979	December 1978	December 1977	December 1976	December 1975	December 1974	December 1973	December 1972	December 1971
1. Government of Canada:									
- Treasury Bills	13,835	13,135	10,315	7,845	6,200	5,630	4,690	4,160	3,830
- Other, less than 3 years	8,892	7,774	7,729	7,011	6,957	6,325	5,699	5,856	5,300
2. Provincial & Municipal Notes	815(1)	637	448	556	774	462	536	603	529
3. Bankers' Acceptances	2,100	1,664	1,166	1,135	1,047	903	342	390	403
4. Chartered Banks:									
- Corporate Deposits	31,382	26,911	22,541	18,887	14,517	11,770	9,686	8,265	6,375
- Swapped Deposits	1,704	1,538	1,545	1,281	848	1,787	880	270	758
- Other foreign currency deposits with Canadian residents booked in Canada	10,514	9,857	5,845	5,403	3,528	3,255	2,022	1,206	930
5. Trust & Mortgage Loan Co. (-1 year)	3,688(2)	3,436	2,462	2,108	1,824	2,381	1,837	1,472(3)	1,063
6. Commercial Paper including Sales Finance Co. Paper	10,895(4)	9,670	7,908	7,147	6,077	5,927	3,705	2,820	2,594
	83,825	74,622	59,959	51,373	41,772	38,440	29,397	25,042	21,782
Rate of Growth	29.6%*	24.5%	16.7%	23.0%	8.7%	30.8%	17.4%	15.0%	4.5%
Official Money Market	22,727	20,909	18,044	14,856	13,157	11,955	10,389	10,016	9,130
Private Money Market	61,098	53,713	41,915	36,517	28,615	26,485	19,008	15,026	12,652

(1) April
(2) March
(3) New series beginning 1972
(4) Estimate
* Annualized

Source: Bank of Canada Review

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TABLE 3

Institutional Lending Structure of Canadian Capital Market

Institutions	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
	($ millions)										
Chartered Banks (Canadian dollar assets)	28,940	31,000	33,616	39,958	46,650	56,455	68,481	77,169	88,790	102,819	122,218
Trust and Mortgage Loan Companies	7,985	9,063	10,343	11,629	13,381	16,466	19,185	22,621	27,667	32,633	38,389
Life Insurance Companies	13,373	13,914	14,622	15,544	17,027	18,604	20,072	22,300	24,576	28,057	30,704
Trusteed Pension Plans	8,923	9,950	11,011	12,461	14,004	15,933	18,075	20,917	24,118	29,041	34,118
Credit Unions and Caisse Populaires	3,758	4,103	4,570	5,532	7,040	8,814	10,315	12,791	15,692	19,618	23,976
Financial Corporations	4,927	5,652	5,502	5,595	6,282	8,161	9,521	10,323	11,073	11,908	12,825
Property and Casualty Insurance Companies	2,467	2,716	3,041	3,322	3,863	4,280	4,753	5,477	6,551	8,254	9,283
Caisse de Depot	684	990	1,383	1,767	2,236	2,952	3,559	4,305	5,321	6,494	7,988
Investment Dealers	795	1,236	1,752	3,040	2,953	3,447	3,661	4,689	4,657	4,524	5,512
Alberta Heritage Fund	-	-	-	-	-	-	-	-	2,218	3,374	4,705
Mutual and Closed End Funds	3,411	3,669	3,445	3,708	3,484	3,459	3,414	3,540	3,266	3,523	4,116
Canadian Afiliates of Foreign Banks	-	-	-	-	-	-	1,819	1,869	2,402	3,349	4,435
Federal Business Development Bank	379	423	498	558	614	734	981	1,171	1,278	1,417	1,494
Quebec Savings Banks	571	542	569	637	709	805	884	971	1,118	1,270	1,452
	76,213	83,258	90,352	103,751	118,243	140,110	164,720	188,143	218,727	256,281	301,215
Rate of Growth	12%	9%	9%	15%	14%	18%	18%	14%	16%	17%	18%
Rate of Growth in GNP	9%	10%	7%	10%	11%	17%	19%	12%	16%	10%	10%

Source: Bank of Canada Review
Statistics Canada
Selected Balance Sheets

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Table 4

SECONDARY TRADING ACTIVITY IN THE CANADIAN

BOND AND MONEY MARKET

($ millions)

BOND TRADING	1975	1976	1977	1978	1st Quarter 1978	1st Quarter 1979
Canadas due in more than 3 years	$ 5,209	$ 8,481	$ 11,781	$ 12,252	$ 3,159	$ 4,855
Provincials - Bonds	5,377	7,171	6,879	n/a	1,404	1,318
- Savings Bonds	46	40	2	n/a	-	-
- Total	$ 5,423	$ 7,171	$ 6,881	$ 5,636	$ 1,404	$ 1,318
Municipals - Bonds	607	589	934	781	279	131
Corporations - Paper due 1-5 years	366	892	1,303	2,278	578	322
- Bonds	4,518	5,461	6,169	5,044	1,464	1,399
- Total	$ 4,884	$ 6,353	$ 7,472	$ 7,322	$ 2,042	$ 1,721
Other	2,036	833	991	626	155	109
Total Bond Trading	18,159	23,427	28,059	26,617	$ 7,039	$ 8,134
MONEY MARKET TRADING						
Canada Bills	$ 11,598	$ 14,355	$ 29,700	$ 50,567	$ 10,534	$ 12,746
Canada Bonds due within 3 years	5,367	3,573	3,268	3,343	1,175	822
Provincial Bills	3,536	3,732	2,386	3,670	713	911
Municipal Bills	1,081	1,238	963	745	297	252
Canadian Bankers Acceptance	15,659	14,444	14,706	18,985	3,632	6,163
Canadian Bank Paper	16,055	20,028	27,254	42,351	8,508	13,425
Foreign Bank Subs Paper due within 1 year	1,604	2,307	8,494	13,048	2,284	4,005
Corporate Paper due within 1 year	25,638	28,616	29,490	32,395	7,413	8,777
Finance Company Paper due within 1 year	18,892	20,630	29,115	29,421	7,073	8,573
TOTAL Money Market Trading	$ 99,430	$108,923	$145,376	$194,525	$ 41,669	$ 55,674
TOTAL BOND AND MONEY MARKET TRADING	$117,589	$132,350	$173,435	$221,142	$ 48,669	$ 63,808

Source: Investment Dealers Association of Canada.

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Table 5

SECONDARY TRADING ACTIVITY IN THE CANADIAN

EQUITY MARKET

(thousands)

I. Volume of Shares

	Toronto Stock Exchange	Montreal Stock Exchange	Vancouver Stock Exchange	Alberta Stock Exchange	Total
1979 (1st Half)	624,415	82,450	363,326	37,421	1,107,612
1978 (1st Half)	451,760	28,947	296,397	17,668	794,772
1978	984,913	62,707	596,925	40,016	1,684,561
1977	679,822	103,689	544,433	31,696	1,359,640
1976	549,210	119,337	453,919	25,784	1,148,250
1975	469,587	135,341	489,843	14,298	1,109,069
1974	568,249	227,010	557,821	6,264	1,359,344
1973	663,856	296,475	592,745	10,215	1,563,291

II. Value of Shares

	Toronto Stock Exchange	Montreal Stock Exchange	Vancouver Stock Exchange	Alberta Stock Exchange	Total
	$	$	$	$	$
1979 (1st Half)	8,365,527	1,317,082	478,090	98,999	10,259,698
1978 (1st Half)	4,387,273	492,190	281,037	42,827	5,203,327
1978	10,362,028	765,887	610,514	94,301	11,823,730
1977	6,044,753	1,376,613	395,075	59,081	7,875,522
1976	5,093,469	1,483,613	328,312	46,444	6,951,838
1975	4,089,020	1,384,724	314,501	17,945	5,806,190
1974	4,523,564	1,597,978	464,169	5,717	6,591,428
1973	6,737,076	2,173,992	483,271	7,123	9,401,462

Source: Toronto Stock Exchange
Montreal Stock Exchange
Vancouver Stock Exchange
Alberta Stock Exchange

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THE OPTIMAL SAVINGS QUESTION: AN ALBERTA PERSPECTIVE

by

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A paper prepared for the Conference on the Alberta Heritage
Savings Trust Fund at the University of Alberta,
October 18-19, 1979

Outline

1. Introduction
2. Specifying the Objective Function
3. Specifying the Economic Constraints
4. The Role of Inter-Provincial Migration
5. The Role of Public Savings
6. The Trust Fund in Economic Perspective
7. Some Fundamental Policy Conclusions

there can be a variety of alternative viewpoints, is explored in the next section. The following sections go on to consider the constraint functions, to discuss the central issue of interprovincial migration, to examine the role of public savings schemes, to present a brief economic perspective on the HSTF, and to derive some fundamental policy conclusions from our analysis.

2. SPECIFYING THE OBJECTIVE FUNCTION

In keeping with the optimal savings literature, we assume that the utility obtained in any time period by the representative individual in society depends, among other things, upon the quantity of real goods and services which he consumes at that time. These goods and services are of two types, private goods provided by the business sector through the market place, and public goods provided directly, and often collectively, by the government sector. These public goods take the form of government services and social overhead facilities, and are financed through the direct taxation of provincial residents and through the collection of non-renewable resource revenues.

As a result of both the size and the growth of non-renewable resource revenues, Albertans have come to expect their provincial government to provide them, on a per capita basis, with a high level of public goods and services in relationship to the direct taxes which they pay. Without these non-renewable resource revenues, the provincial government would have to impose a substantial increase in direct taxation in order to provide these goods and services to Alberta residents. This tax increase would lead

inevitably to a reduction in the ability of Alberta residents to purchase private goods and services in the market place. From this point of view, the primary function of the HSTF (and other related provincial surpluses) is to enable the provincial government to continue the provision of a reasonably high level of public goods and services after the stream of non-renewable resource revenues begins to decline in real terms on a per capita basis, without imposing a substantial increase in direct taxation. This becomes all the more important if the population is expected to be substantially larger in the future as a result of inter-provincial migration, particularly if there are few scale economies or agglomeration effects in the overall provincial economy to be captured through its expansion.

Also in keeping with the optimal savings literature, we assume that the utility obtained by the representative individual in society from the future consumption of either public or private goods is discounted at some, probably small, time-preference rate. This time-preference rate is an important element in the determination of the social rate of discount. The larger is the time-preference rate, the smaller will be the society's propensity to save, and therefore the smaller will be the stock of capital it will accumulate to enhance the consumption possibilities of future generations.

In order to advance from the utility obtained from consumption by the representative individual in society to a provincial objective function, it is necessary to consider the question whose utilities or benefits are to be taken into account.

In addition to the utility of provincial residents, should the utility of non-resident nationals be taken into account in a provincial objective function? Given that national cohesiveness is of some importance to the component parts of a federal state, at least to some extent a provincial government can be expected to take into account the interests of other parts of the federation in deciding how to use its resource revenues, etc. Thus, some weight may well be given to the utility of non-resident nationals in the provincial objective function, though in all probability this weight will be considerably less than that given to the utility of provincial residents. To simplify matters, we choose to put this consideration on one side.

The existence of inter-provincial migration, however, introduces further complications. Apart from time-discounting, should all provincial residents, present and future, be given equal weight in the provincial objective function? Should no distinction be made between new immigrants to the province and provincial residents of much longer standing? The province may take the view that a large-scale population increase through migration from the rest of the country is undesirable, whether or not the migration flow reverses itself after the stream of non-renewable resource revenues begins to decline in real terms on a per capita basis. Hence, it may wish implicitly to give each new resident arriving in the province through migration a smaller weight in its objective function than existing residents. One way of incorporating this possibility would be to attach a weight which is less than unity to provincial population size in the objective function, rather than

the more traditional unitary weight appropriate whenever migration is unimportant. To do so, however, further discriminates against the consumption possibilities of the potentially more numerous generations of future residents. In consequence, it would lead to increased present consumption, larger short-run in-migration and more long-run out-migration as the stock of non-renewable resources is depleted. If longer-run population losses are not considered to be at least as undesirable and costly to the province as shorter-run population gains, it pays to smooth the flow of inter-provincial migration, and thus to give equal weight (time-discounting apart) to all provincial residents, old and new, present and future. Hence, we assume that the weight attached to provincial population size in the objective function is equal to unity.

On this assumption, a society will choose to forego present consumption per head in order to acquire a larger consumption per head tomorrow as long as its time-preference rate is smaller than the real rate of return on capital investment; it will gradually consume its per capita capital stock if the reverse is true, and it will maintain a constant level of consumption per head if its basic time-preference rate is equal to the real rate of return on capital. In the case in which society's income is generated from resource rents associated with the depletion of a non-renewable resource stock, to maintain a constant level of consumption per head requires the saving of (n+d)/(r+d) per cent of the stream of resource rents accruing each year, where n is the rate of population growth, r is the real rate of return (net of inflation) earned by the savings fund and d is the rate of decay in the stream of resource

rents in real terms. Given n = 2%, one may tabulate the required savings propensities (s) for various values of r and d as follows:

		Real Rate of Return (r)		
		3%	4%	5%
Rate of Depletion (d) of Resource Stock (in real value terms)	1%	0.750	0.600	0.500
	3%	0.833	0.714	0.625
	5%	0.875	0.778	0.700

The fact that all the numbers in this table exceed the 30% savings propensity applied to the stream of resource revenues for the purpose of creating the HSTF suggests that a choice is being made for a declining stream of consumption per head from these resources over the longer term. This implies one of two possibilities: either the use of a time-preference rate which is somewhat higher than the illustrative real rate of return used in each case depicted in the previous tableau, or the use of an objective function in which the weight attached to provincial population size is less than unity. Indeed, if for either or both of these reasons the stream of consumption per head from these resources is chosen to decline at the same rate as population expands, say 2% per annum as before, then the tableau of required savings propensities - effectively, in this case, giving the values of d/(r+d) - becomes the following:

		Real Rate of Return (r)		
		3%	4%	5%
Rate of Depletion (d) of Resource Stock (in real value terms)	1%	0.250	0.200	0.167
	3%	0.500	0.429	0.375
	5%	0.625	0.556	0.500

Notice that the 30% savings rule is now well within the bounds of these numbers, thus illustrating the importance of the manner in which time-preference and population growth are handled in the provincial objective function. These two sets of figures, however, should not be taken too seriously, since from a more robust optimization point of view neither the rate of depletion (d) nor the rate of provincial population growth (n) can be taken to be independent of the real rate of return (r) or the savings rate (s) that is applied to the stream of non-renewable resource revenues.

3. SPECIFYING THE ECONOMIC CONSTRAINTS

The revenues placed in the Alberta Heritage Savings Trust Fund are derived from the development and extraction of petroleum resources, and more particularly conventional oil and natural gas, which are limited in supply. Although exploration and development activity can expand the volume of proven reserves of conventional oil and natural gas, it is clear that existing rates of extraction will, if continued, eventually exhaust the supply of these resources that can profitably be extracted at any given technological and cost-price configuration. Assuming that alternative sources of energy continue to be available to the world economy, and therefore that the real price of energy does not escalate faster than the rate of extraction within Alberta declines, the time-stream of Alberta's non-renewable resource revenues must eventually decline in real terms as her conventional oil and natural gas reserves are depleted. The existence of substantial heavy oil and tar sands deposits within the province does not alter this picture, since the

resource rents that the development and extraction of these deposits will generate are most unlikely to be as large as those for proven reserves of conventional oil and natural gas, given any reasonable forecast of the evolution of technological knowledge and associated cost-price relationships.

On these assumptions, an economy such as Alberta's which has the ability to extract and export a non-renewable resource in finite supply might well be expected to want to build up a stock of capital, or a heritage savings trust fund which includes external or foreign assets as well as domestic assets, on which it can survive as a rentier after its finite stock of exhaustible resources has been depleted and its associated stream of resource rents declines. Indeed, such a course of action definitely seems to be the prudent course if appropriate consideration is taken of the needs of future generations, particularly if these generations are expected to be more numerous than the present generation of provincial residents.

The allocation of such a fund over alternative capital assets, domestic or external, will depend upon relative rates of return. Indeed, if differences in riskiness are ignored, the allocation should be such that rates of return on domestic and external assets are equated at the margin. However, the less myopic a society is, the lower will be the social rate of discount, and the larger should be both the domestic and the external stock of capital assets. In addition, the more one wishes to temper the rapid expansion of provincial population in the shorter term, the larger should be the accumulated stock of external assets in

relationship to those created domestically. Put differently, the faster is the pace of domestic capital formation, the more quickly will employment opportunities expand within the province; in consequence, the greater will be the rate of expansion of both the provincial labour force and the population residing in the province.

Naturally, there is of course some limitation to this process, since the costs associated with migration into the province increase at the margin as more people move in, largely because of the associated escalation in land prices and housing costs relative to those elsewhere in the country. In this sense, new migrants have to buy their share of the publically-owned trust fund when they move into the province through the relatively high land prices and housing costs which in some crude way may be thought to have already capitalized the expected stream of resource rentals accruing to provincial residents through their implicit ownership of the trust fund. As we shall explore later in this paper, one of the benefits that might well result from the privatization of the trust fund, that is the giving away to current provincial residents on a one-time-only basis transferrable share certificates in the fund, would be the reduction, if not the elimination, of this crude capitalization-through-land-prices effect.

If the faster pace of domestic capital formation is also directly associated with the more rapid construction of facilities designed to develop and extract the non-renewable resource, as opposed to investments of a diversifying nature, the more rapid will be the eventual fall-off of both employment and economic activity as the extractive industry matures and the stock of proven reserves

becomes depleted. Such a boom-bust scenario is likely to have substantial adjustment costs associated with it, not only in the construction boom phase but also, and at least as importantly, in the exhaustion bust phase. Unless the out-migration response is quite rapid, it also implies a larger provincial population to supply with public goods and services after the boom subsides. In consequence, in such a scenario the drain on the provincial treasury would be substantial, both because of the rapid decline in non-renewable resource revenues and because of the considerably expanded provincial population.

The conclusion that arises from this brief analysis is that it will pay the province in the longer-run to control the pace of domestic construction activity, and to reduce the temporary expansion of employment and population and its associated tendency towards inflationary over-heating in the economy, so that the expansion phase is sustained for a longer period of time. In order to achieve this, a substantial portion of the existing non-renewable resource revenues should be invested outside of the Province of Alberta. The main alternative to this "rentier society" solution is, of course, a deliberate attempt at "province-building" via the industrial diversification route. But this alternative would at best sustain employment and economic activity; the decline in non-renewable resource rents and in the government's ability to provide public goods and services to provincial residents without commensurate levels of direct taxation would still be unavoidable. Moreover, what is known about the factors which determine patterns of comparative cost advantages among trading partners would tend to

cast serious doubt upon the economic viability of wholesale diversification into manufacturing industries, though clearly some particular manufacturing industries might well be practicable.

One of the complications arising from the conclusion that controlled expansion is desirable is that the rest of the country may place a great deal more urgency on the development and extraction of known petroleum resources than the province of Alberta. In this sense, Alberta may exhibit a smaller rate of time-preference than the rest of the country. (It is also possible that the Government of Alberta also has a lower rate of time-preference than its counterparts elsewhere in Canada because its current overwhelming majority leads it to expect to be in power longer than the next election or two.) But if this is so, the recycling of a substantial proportion of resource rents back to other provinces via external loans and investments may also make substantial economic sense, though some compromise will have to be made on the rate of depletion of known petroleum reserves.

The literature on optimal accumulation with non-renewable resources also has something to say about optimal resource depletion. Broadly speaking, the existing stock of proven reserves may be thought of simply as a capital asset. The return on keeping this asset in the ground is the proportional rate of change expected in the net revenue obtainable from its extraction. Differential risks aside, this proportional capital gain from resource ownership, represented by the return obtained from the withholding of resource stocks from the production process, should be equated to the rate of return obtained from the use of capital equipment in the production

process, or from capital goods in general. Thus, the rates of return on all three forms of assets, domestic capital, external capital assets and the resource stock should be equated at the margin in any optimal investment allocation. Moreover, in a steady-state situation in which risk is ignored, these three rates of return must be equated to the social rate of discount, which is itself dependent upon society's time-preference rate. Finally, if the non-renewable resource can either be used up in the domestic production process or exported to third parties, an efficient allocation requires that the return at the margin from exporting the resource (the marginal export price) must be the same as the return obtained when it is used up in the domestic production process.[1]

Of course, none of these marginal propositions tells one what to do without further detailed information on the form of the underlying functional relationships. They are merely properties that must hold along any efficient path of capital accumulation and resource extraction. In addition, they do not even tell us whether or not a non-decreasing path of consumption per head is possible over the longer-run. Indeed, such a path is possible only if (a) there exist sufficient substitution possibilities between capital and non-renewable energy resources, and among alternative energy sources, non-renewable and renewable, themselves, in the

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[1] For more details on the points raised in this paragraph, see B. L. Scarfe, "On Optimal Accumulation in an Open Economy", University of Alberta, Department of Economics Research Paper No. 78-14.

basic production processes of the economy, and (b) the rate of "resource-augmenting" technological progress exceeds both society's time-preference rate and its population growth rate.[2]

Thus, as intuitive reasoning suggests, substitutability is of paramount importance to the resource scarcity problem. Moreover, the consumption possibilities available to future generations depend upon the time-honored race between diminishing returns and technological change. These possibilities may be widened by greater saving and smaller consumption in the present, so that increased capital inputs may to some degree substitute for reduced resource inputs in the future. Nevertheless, a society which neglects the resource constraints of the future will necessarily consume too much in the present, perhaps following for a time a path of rising consumption per head, a path whose economic costs are imposed upon future generations as the time stream of consumption per head eventually decreases. For the moment, however, we shall put these more global speculations on one side.

4. THE ROLE OF INTER-PROVINCIAL MIGRATION

Since in our analysis inter-provincial migration must be permitted to occur, the proportion of the national population resident in the resource-extracting province must be taken to be an endogenous variable. This fact alone makes formal analysis of the optimal savings question exceedingly complicated. But in many ways

[2] See B. L. Scarfe, Cycles, Growth, and Inflation, New York, McGraw-Hill, 1977, pp. 83-90.

the endogeneity of both population and the supply of labour within the province lies at the heart of the policy questions surrounding the HSTF.

We take the view that inter-provincial migration occurs in response to economic incentives. An individual, or family unit, will move from one province to another if the present value of the stream of benefits expected to accrue from relocation exceeds the combined economic, psychic, and other costs associated with the move. The stream of benefits must clearly reflect the relative wage rates and other economic advantages that an individual may expect to receive, modified by the relative probabilities of finding an appropriate job opportunity, and the costs must include differences in land values and housing costs since these are a fundamental component of existing differences in the cost-of-living among provinces.

With or without the existence of a heritage savings trust fund, the simple existence of significant resource rents and the generally favourable business and tax climate in the Province of Alberta are likely to generate a continuous flow of new migrants from other provinces, particularly if they are coupled with a construction boom associated with resource-extractive projects. Indeed, Alberta has been receiving about 100 new migrants per day over the past two or three years; thus, the provincial population has been growing by about 1.5 percent per year from net migration alone over this recent period. The impact of this flow of migrants on the supply-demand balance in land and housing markets will sustain the present situation in which the stream of resource rents

is capitalized in some crude way into land and housing prices.

The key question for the management of a publically-owned trust fund is whether or not actual decisions concerning the size and allocation of the fund have any direct influence on the flow of new migrants. Although periods of rapid economic expansion and in-migration like Alberta has recently been experiencing tend for a while to develop a momentum of their own, in our view the answer to this question is definitely in the affirmative. Indeed, decisions concerning the proportion of non-renewable resource revenues that are saved by the government sector instead of being immediately allocated to current consumption, and the manner in which these savings are allocated to alternative investment activities, are the primary mechanisms through which the government may be able to influence the overall pace of economic activity and the rate of provincial in-migration.

The HSTF performs a useful role in stabilizing, to a degree, the rate of growth of Alberta's population over time, and thus in smoothing out the associated pressures on housing and land prices, and on capital investments related to the provision of public services. The reason for this conclusion is essentially simple: the alternative to the saving of substantial amounts of natural resource revenue is to spend this revenue on current consumption, an alternative which would attract more present migrants without creating the means to sustain them after the resource revenues begin to dwindle.

Given the size of its non-renewable resource revenues, if the provincial government maintained only a balanced budget, its

current spending would have to be higher and/or its current direct tax revenues would have to be lower by a combined total of about two billion dollars a year. Spread over a population of two million, this is one thousand dollars per person per year, or four thousand per year for a family of four. If this sum were disbursed by the provincial government in attractive forms, especially including major tax reductions, the immediate stimulus to the local economy and the associated attraction to migrants would represent a substantial addition to that already arising from existing developments in the energy sector. By accumulating large current budget surpluses, including surplus revenue not formally placed in the Heritage Fund as well as additions to the Fund itself, the province is suppressing this additional stimulus to demand and to in-migration.

The Fund does, of course, provide a longer-term attraction to migrants. Each billion dollars added to the Fund deprives the average resident of Alberta of about five hundred dollars of immediate benefit in the form of either tax rebates or government services; but if it was invested by the province at a real rate of interest of perhaps 3% per year, it would yield fifteen dollars per head in provincial revenues each year as a permanent support for lower taxes or higher government services. To a potential migrant who is fully informed, rational, young and healthy, and who discounts the future at 3% per year, this fifteen dollars per year would be just as attractive as five hundred dollars once and now. But one supposes that most people young enough to expect to receive the fifteen dollars per year for enough years to bring their present value towards five hundred dollars are also too young to discount

the future by as little as 3% per year. For this, or for whatever reason, it seems likely that five hundred dollars now would attract more migrants than would fifteen dollars per year in perpetuity.

Even if all migrants are perfectly informed and rational and have a 3% discount rate, and thus regard fifteen dollars per year of Heritage Fund earnings as just as attractive as five hundred dollars at once, the creation of a Heritage Fund will stabilise the provincial economy over time. If provincial resource revenues are distributed as quickly as they arise, migrants may come in, receive them as fast as they appear, and then leave again when they dwindle. If the benefits of resource revenues are received by residents as a continuing income rather than as a lump sum, their present value is high only to those who plan to remain in the province indefinitely, and the in-migration of transients is not encouraged.

It is also of interest to note that government saving into the Heritage Fund tends not only to deter early in-migration and thus to reduce pressure on housing prices, compared with the alternative of currently spending all resource revenues. It also tends to improve the prospects for the growth of the non-resource sectors of the economy after the resources are gone. To the extent that Heritage Fund income is available to attract population, these industries will have a more plentiful labour force after the non-renewable resources are exhausted.

In summary, by saving resource revenues instead of dissipating them in lower taxes or greater expenditures, the provincial government helps to give the province a more even pattern of growth, with less immigration now, less pressure on land prices and social

overhead capital now, and greater means of sustaining population and less danger of a collapse of land prices in the longer-term future when resource revenues decline. This point is, presumably, merely common sense without surprises. The point does, however, leave no limit to the proportion of natural resource revenues that should be added to the Heritage Fund or other government savings. Indeed, by itself, it suggests that almost all provincial revenues from exhaustible resources should be saved, not merely 30% or less than half of them. However, one should recall the arguments presented in earlier sections of this paper; it can be optimal to save less if one discounts the future more, but the proper degree of discounting is inherently a moral question and not really one of technical economics.

5. THE ROLE OF PUBLIC SAVINGS

So far, we have considered the economic constraints under which an open resource-extracting economy operates, paying special attention to the role of inter-provincial migration. We have also considered the main ingredients which might enter the provincial objective function. Even if such a function exists, however, it need not be implied that the government itself has to be involved in the savings-investment process. Indeed, one of the questions that immediately comes to mind is why the provincial government rather than the private sector should be doing the savings involved in the HSTF at all. What would be the consequences of distributing the HSTF to current Alberta residents?

There are basically two ways, that might well be used in

conjunction, in which this could come about. The first is simply to cut current and, at least for some time, future direct tax rates on provincial residents, and the second is to give away to each current provincial resident a fixed but equal number of transferrable share certificates in the existing trust fund on a one-time-only basis, that is by the privatization of the fund. More generally, a combination of these two alternative mechanisms might be employed. For example, given projected government expenditures, the provincial authorities might agree to add x% of the non-renewable resource revenues received in each of the next T years to an initially privatized fund, to contribute y% of these revenues towards the creation of the second of what might eventually become a whole time-sequence of separate trust funds each perhaps to be privatized at an appropriate time in the future by share distribution to provincial residents of record on a specified date, and to distribute any remaining surplus (or deficit) through direct tax cuts (or tax increases). In the current non-privatized situation, of course, x + y together amount to 30% of non-renewable resource revenues.

These two alternative mechanisms (and, more generally, the choice of the percentages of non-renewable resource revenues placed in the privatized and not-yet-privatized trust funds each year) have very different consequences for the distribution of income and wealth within and without the province. They also have very different consequences for the rate of immigration into Alberta from other provinces, and for the rate of inflation in Alberta with particular reference to the escalation of land prices, through which the implicit ownership of the existing non-privatized HSTF by

provincial residents may already have been capitalized. Despite these differences, they have one thing in common, namely that they transfer to the private sector the burden of saving for the future provision of public goods and services, with their being no explicit guarantee that the interests of future generations of Albertans would thereby be adequately considered.

There are at least three separate reasons for this. First, private individuals might fail to take account of the impact of the consumption levels attained by the descendents of other provincial residents on the utility of their own offspring. They might therefore use a private time-preference rate which overstates the social time-preference rate, and therefore undertake inadequate levels of saving. Secondly, they might fail to take account of the impact of those population changes which result from interprovincial migration. Whatever capitalization effects influence the land prices that have to be paid by in-coming provincial residents, and thus their ability to consume private goods other than housing services, they must still be afforded the same opportunities for the consumption of public goods, and especially collective goods, as existing provincial residents of longer standing. The public sector must take account of this additional demand for public goods whereas private individuals might not. Implicitly, therefore, through the way in which population is weighted in the provincial objective function in comparison to individual utility functions, society as a whole may well need to operate with a lower discount rate than the representative private individual. Thirdly, in a federal state in which equalization payments remain a possibility, private individuals

might fail to take account of the savings required to provide future non-resident nationals with an adequate stream of public goods to consume.

As we shall maintain throughout this paper, we consider it essential for the whole of Canada that someone undertake the required saving for the days when our non-renewable resource stocks are depleted; the fact that a provincial government is undertaking at least part of this saving may at least guarantee that it actually occurs. Hence, for these various reasons we are not in favour of distributing the HSTF to current Alberta residents either through reduced direct taxation or through the privatization of the fund, though for several reasons that were specified earlier we are more opposed to the tax-cut mechanism than the privatization mechanism.

We recognise, of course, that "displacement effects" between public and private savings may well occur. More explicitly, the total savings undertaken by society may not increase in a one-for-one manner with the volume of savings undertaken by its public sector, since private individuals may be inclined to save less when they recognise that the public sector has increased its propensity to save. Nevertheless, it is very difficult to imagine there being a one-for-one offset, unless one is in a rigid Keynesian situation where the overall volume of investment is totally unresponsive to market rates of interest. It follows that, if the response of private savings behaviour to additional public savings is reasonably predictable, then the overall volume of savings can ordinarily be controlled by varying the public sector component of it.[3]

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[3] For a much more detailed discussion of this point, see K. J. Arrow and M. Kurz, Public Investment, The Rate of Return, and Optimal Fiscal Policy, Baltimore, Johns Hopkins, 1970.

The most likely situations in which public savings would displace private savings are, first, when the public savings take the form of a pension fund, which would directly reduce each individual's need for private savings for retirement purposes, and, secondly, when the public savings are generated by a direct levy on corporate profits. The first case is not particularly pertinent; the Heritage Fund is not earmarked for pensions. The second case is, however, more relevant. It does seem likely that the private corporate sector would retain and reinvest a large fraction of any revenues it would gain if the province sharply reduced its royalties, instead of distributing these revenues either to shareholders as dividends or to consumers via lower prices. Thus, by collecting the royalties, the province reduces private savings in the corporate sector. But the large proportion of foreign-owned firms in the oil and gas industry implies that these savings would for the most part effectively be the savings of the foreign shareholders and not the savings of domestic residents. Hence, in this case, total domestic savings increase when resource royalties are saved and invested by the provincial government.[4]

If it is possible to control the overall volume of savings by varying the public sector component of it, then the proportion of non-renewable resource revenues saved may be used as a device for regulating the overall pace of economic activity and the rate of provincial in-migration. To be so used as a stabilization device,

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[4] For considerable expansion on this point, see B. W. Wilkinson and B. L. Scarfe, "The Recycling Problem", a paper prepared for the Energy Conference at the Ontario Economic Council, Sept. 27-28, 1979.

this proportion may well have to be permitted to be variable, rising when the pace of resource development and extraction, and the associated level of economic activity, picks up, and falling when this activity slackens. Such a policy of varying the public sector savings rate may also serve to stabilize the rate of in-migration, and thereby the volatility of the residential property market and the level of housing starts.

From this point of view, a fixed savings rule is unlikely to be optimal. The fact that 30% of non-renewable resource revenues are placed each year in the HSTF does not, however, constitute a rigid savings rate, since the resource revenues placed in the fund do not represent the sum total of annual savings undertaken by the Government of Alberta. In any case, the 30%-rule could easily be altered by legislated amendments to the HSTF Act, though this would involve a time-lag which would be rather unhelpful from the viewpoint of stabilization policy.

The proportion of non-renewable resource revenues saved should clearly reflect two fundamental trade-offs, namely that between present economic growth and future economic growth, and that between rapid population expansion in the shorter-term and the expansion or maintenance of consumption per head in the longer-term. Given the non-renewability of Alberta's energy resources, if the preferred path of development is one of steady controlled growth which avoids a boom-bust cycle and places more weight on the expansion or maintenance of consumption per head in the longer-term than upon rapid population expansion in the shorter-term, then the current savings rate should necessarily be set at a high level. Indeed, we

shall argue in the next section that, given such a preference, the current rate of public sector savings in the province of Alberta is lower than it ought to be. In sum, it is essential to accumulate a substantial heritage savings trust fund at the present stage of Alberta's economic boom, not only to regulate the current pace of economic expansion but also to permit a wider range of options for provincial control over the rate of growth of the Alberta economy in the longer run.[5]

6. THE TRUST FUND IN ECONOMIC PERSPECTIVE

In earlier sections, we have suggested that the Province of Alberta is not saving enough of its non-renewable resource revenues. The Heritage Savings Trust Fund may be smaller than it ought to be, partly because some resource revenues are being dissipated in direct tax levels which are too low and partly because some are being dissipated in levels of government spending which are too high. In one sense, however, this merely asserts the unprovable statement that the province is acting as if its underlying time-preference rate is higher than it ought to be, or as if the present and future expansion in its population is being heavily discounted in the provincial objective function. Nevertheless, the following calculations are illustrative of this point of view.

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[5] For a similar line of reasoning, compare D. T. Kresge, T. A. Morehouse and G. A. Rogers, Issues in Alaska Development, Seattle, University of Washington Press, 1977. (A study prepared through the Institute of Social and Economic Research at the University of Alaska.)

TABLE I

	Alberta	Ontario	Canada Total
	$000,000	$000,000	$000,000
(1) Consolidated Revenues of Provincial and Local Governments (including hospitals), 1977	5,763	15,217	48,137
(2) Transfers from Government of Canada, 1977	636	2,542	9,961
(3) Royalties, 1977	2,150	44	2,687
(4) All Revenues from own sources, excluding royalties, 1977 (1)-(2)-(3)	2,977	12,631	35,489
(5) Provincial and Local Government Current Expenditures (including hospitals), 1977	3,923	15,856	45,340
(6) Consolidated Budget Surplus, 1977 (1)-(5)	1,840	-637	2,797
(7) Net provincial income at factor cost, excluding royalties, 1977	16,773	66,087	165,279
(8) Population, June 1977 (thousands)	1,895.6	8,354.0	23,257.7
(9) Government Expenditure Per Person ($) (5)÷(8)	2,070	1,898	1,949
(10) Tax Effort (%) (4)÷(7)	17.75%	19.11%	21.47%

Sources: Statistics Canada, Provincial Economic Accounts, 13-213, and Canadian Statistical Review, 11-003E.

Table I gives some basic data for Alberta, Ontario and Canada Total for the year 1977. Line 10 of this table gives a rough measure of "tax effort". That is to say, it shows what percentage of net provincial income, excluding royalties, is appropriated by provincial and local government revenue. In defining revenue we exclude transfers from the Government of Canada and royalties, and in defining net provincial income we also exclude royalties. The reason for this is as follows. If royalties are taken as a proxy for the value of the sale of exhaustible resources (and a better measure appears to be elusive), then they should be shifted out of the current account and into the capital account, so that the correct measures of provincial net incomes and government current revenues each exclude royalties. On this basis, Alberta's "tax effort" is equal to 17.75%, below that of both Ontario and the other provinces. If one takes Ontario's 19.11% as the correct standard, one would conclude that Alberta should collect in taxes an extra 1.36% of its net provincial income excluding royalties, or $228 million dollars, and, by not doing so, is dissipating its exhaustible wealth in too-low taxes. If Canada Total is taken as a norm, the corresponding figures are 3.72% and $624 million dollars, respectively.

In addition, Alberta's per capita government expenditure of $2,070 exceeds both that of Ontario and the other provinces. If one takes Ontario's $1,898 as a standard for comparison, Alberta is spending $172 per head, or $326 million dollars, too much. If Canada Total is taken as a norm, the corresponding figures become $121 per head, or $229 million dollars, respectively. The actual

government budget surplus (consolidated provincial and local governments) in Alberta in 1977 was $1,840 million. But to match Ontario's tax effort and expenditure pattern, this budget surplus should have been $554 million larger, or $2,394 million, whereas to match the Canada-wide average tax effort and expenditure pattern, it should have been $853 million larger, or $2,693 million. Thus, on the basis of these comparisons the additional non-renewable resource revenues placed in the HSTF in 1977 were too small, partly because taxes were on average lower than elsewhere and partly because expenditures were higher. It is likely that this conclusion would hold for more recent years as well. However, it is not clear what one should really conclude from these comparisons, since there is no reason to suppose that either Ontario's tax effort and expenditure pattern, or the Canada-wide equivalents, are optimal in any fundamental respect.

Even if the Heritage Savings Trust Fund is smaller than it ought to be, it looms large in the eyes of those who are currently envious of Alberta's recent accumulations of financial wealth. It is therefore useful to place the HSTF in perspective. In 1978, total gross investment in Canada amounted to some $53,435 million.[6] During the same period, the new savings accumulated by the HSTF

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[6] In 1978, gross fixed capital formation in Canada amounted to $52,314 million. Adding a figure for the change in inventories, etc., of $1,121 million yields total gross investment of $53,435 million. Of this figure, personal savings amounted to $17,114 million, business savings to $9,807 million, capital consumption allowances to $25,203 million, government savings to -$4,325 million and non-resident savings (or foreign borrowing) to $5,636 million.

amounted to $1,243 million. Thus, the Trust Fund financed 2.3% of gross investment in Canada in 1978. Since gross investment in Alberta represents approximately 17% of the Canadian total, the Trust Fund financed about 14% of total gross investment in Alberta. The increase in HSTF assets during calendar year 1978 represented about one-half of one percent of Canadian gross national product in that year, and the total capital value of the Fund, as at March 31, 1979, of $4,705 million represents only about one year's annual expenditures for the Alberta provincial government.

These figures clearly put the HSTF in an appropriate perspective, in which its importance is not unjustifiably exaggerated. If, once again, the fund is recognised as a replacement asset for non-renewable resources which, once utilised, are foreover lost to future generations, the Province of Alberta is not, in fact, becoming wealthier by the accumulation of its Trust Fund. It is merely forestalling the possibility of becoming poorer in the future. It therefore makes no sense to claim that the Province of Alberta is becoming wealthier at anyone else's expense, except perhaps, at the expense of its own current provincial residents. Certainly it is in no direct way draining resources from the coffers of the Ontario provincial government.

7. SOME FUNDAMENTAL POLICY CONCLUSIONS

The creation of the Alberta Heritage Savings Trust Fund is clearly preferable to the dissipation of provincial natural resource revenues into higher current government expenditures and/or lower current taxation, for two reasons that are largely independent

of how the Trust Fund is subsequently used. First, it smoothes out over time the stream of public and private consumption in Alberta, and, secondly, it smoothes out over time the flow of migrants and the associated pressure on housing, land prices and social services. There is no obvious limit to the proportion of natural resource revenues that should be saved to satisfy these objectives; the greatest smoothing effect would be achieved if virtually all natural resource revenues were saved and invested, particularly if much of the investment takes place outside the Province of Alberta.

The main reason not to save natural resource revenues is the simple fact of human impatience, or preference for present over future consumption. (Another reason not to save, or better still to privatize the existing savings fund, may be that the Heritage Fund is a very conspicuous piece of wealth, which is more vulnerable to various claims of other governments the faster it grows and the larger it becomes; but this point goes outside the present topic.) One cannot recommend current spending merely on the grounds that people are somewhat impatient; that would amount to endorsing impatience itself. But one can describe the rational behaviour that would follow from a given degree of impatience. One formulation of the problem gives the result that the fraction of exhaustible resource revenues to be spent on current consumption would rationally be $1 - (\theta+n+d)/(r+d)$ or $(r-\theta-n)/(r+d)$. Here, r is the real rate of return (net of inflation) on invested savings, d is the rate of decline in non-renewable resource revenues, n is the rate of population growth and θ is the desired growth rate for

consumption per head out of resource revenues and/or the capital fund itself. The main determinant of θ is the relationship between the degree of impatience, as measured by society's time preference rate, and the real rate of return on invested savings (this latter being constrained by technological conditions). For substantial values of d, the proportion of non-renewable resource revenues which can rationally be consumed is quite small, and the corresponding optimal savings propensity is large, larger indeed than the current 30%-rule used for the accumulation of HSTF assets. The 30%-rule becomes rational only if the rate of decline in non-renewable resource revenues (d) is small.

Comparisons of Alberta's tax effort and government expenditure per head with those of other provinces and especially of Ontario show that Alberta is putting substantially less into the Heritage Fund and other government savings than it would be if it had the tax effort and expenditure policies of other provinces. In other words, even though virtually all of Alberta's resource revenues are from the sale of exhaustible assets, a substantial portion of them is being spent on current consumption. The province is, in part, living off capital, in that the Heritage Fund is not given virtually all of the revenues from exhaustible resources. Nevertheless, if one accepts as legitimate even a mild degree of impatience, then it becomes legitimate to spend currently a substantial proportion of exhaustible resource revenues provided that the rate of exhaustion (d) is moderate.

Obviously, the preferred size and growth rate of the Heritage Fund depend upon what opportunities are available for its

use; larger and better opportunities for investment of the fund would justify greater savings into it. This point, however, raises the matter of how to manage the Fund, which will be discussed in other papers. To repeat our basic conclusion, there are two reasons for building up the Fund and other provincial surpluses, and both reasons suggest that a more rapid build-up would be appropriate. First, these present surpluses smooth out the provision of public goods and services over time. Secondly, the Heritage Fund can also be an instrument to smooth the rate of growth of the Alberta economy, and therefore to reduce the severity of the boom/bust problem inherent in resource extraction. The rate of addition of revenues to the fund should thus be tied not only to the goal of smoothing out consumption over time, but also to the goal of regulating the rate of growth of the provincial economy. That is, additions to the fund would constitute a form of provincial fiscal policy, in which the size of the government sector surplus is not simply an end in itself but a means of affecting the provincial growth rate. The existence of budgetary surpluses (and/or deficits) outside the HSTF, however, indicate that this role is already being served by existing provincial fiscal policy.

Finally, we reiterate that it is essential for the whole of Canada that someone undertake the required savings to finance the vast investment expenditures that will be essential as our non-renewable resource stocks, and especially our reserves of conventional oil and natural gas, are depleted. We believe that the major share of the economic rents associated with the extraction of these non-renewable resources should remain with the producing provincial

governments, not only as a matter of right but also because this may be the only way to ensure that the required saving in fact occurs. Some have argued that the Heritage Fund and other Alberta government surpluses represent a kind of Keynesian "fiscal drag" on aggregate demand in the economy. However, they are a drag only if they are not promptly offset by expenditures on new investment projects, or by Federal government deficits. We hope that they will be used to finance the former.